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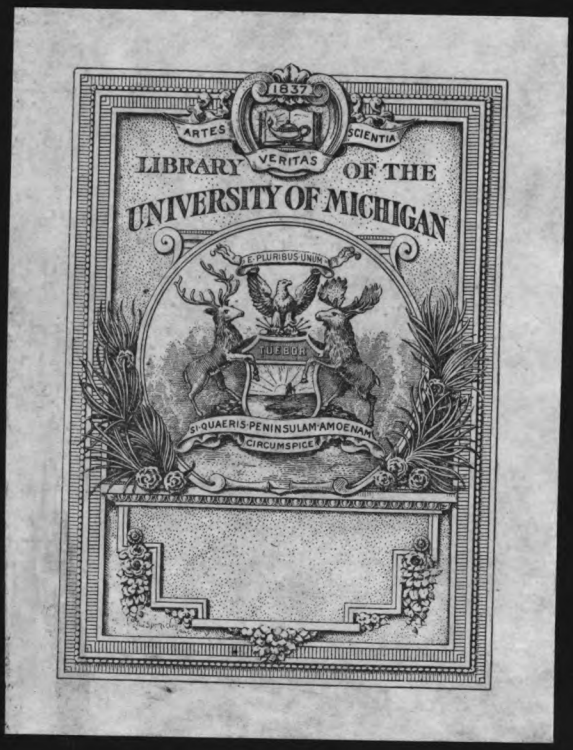


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# TRANSACTIONS

OF THE

# AMERICAN PEDIATRIC SOCIETY

## FIFTH SESSION.

HELD AT WEST POINT, N. Y., MAY 24, 25 AND 26, 1893.

EDITED BY
FLOYD M. CRANDALL, M.D.

## VOLUME V.

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## LIST OF PRESIDENTS.

1889. A. JACOBI, M.D.
1890. J. LEWIS SMITH, M.D.
1891. T. M. ROTCH, M.D.
1892. WM. OSLER, M.D.
1893. A. D. BLACKADER, M.D.
1894. JOHN M. KEATING, M.D.

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## OFFICERS FOR THE YEAR–1893-94.

*President.*—JOHN M. KEATING, M.D. ..... Colorado Springs
*First Vice-President.*—F. FORCHHEIMER, M.D. ..... Cincinnati
*Second Vice-President.*—A. CAILLÉ, M.D. ..... New York
*Secretary.*—SAMUEL S. ADAMS, M.D. ..... Washington
*Recorder.*—WILLIAM PERRY WATSON, M.D ..... Jersey City
*Treasurer.*—CHARLES W TOWNSEND, M.D. ..... Boston
*Editor.*—FLOYD M. CRANDALL, M.D. ..... New York

---

### COUNCIL–1893-94.

CHARLES P. PUTNAM, M.D. ..... Boston
T. S. LATIMER, M.D. ..... Baltimore
L. EMMETT HOLT, M.D. ..... New York
WILLIAM P. NORTHRUP, M.D. ..... New York
WILLIAM D. BOOKER, M.D. ..... Baltimore
T. M. ROTCH, M.D. ..... Boston
J. P. CROZER GRIFFITH, M.D. ..... Philadelphia

### MEMBERS–1893-94.

ACKER, GEORGE N., M.D. ..... 913 Sixteenth Street, Washington
ADAMS, SAMUEL S., M.D ..... 1632 K Street, Washington
BLACKADER, A. D., M.D. ..... 236 Mountain Street, Montreal
BOOKER, WILLIAM D., M.D. ..... 851 Park Avenue, Baltimore
BROWN, DILLON, M.D. ..... 40 East Fifty-seventh Street, New York
BUCKINGHAM, E. M., M.D. ..... 52 Worcester Square, Boston
BUSEY, S. C., M.D. ..... 1545 I Street, Washington
CAILLÉ, AUGUSTUS, M.D. ..... 185 Second Avenue, New York

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CARR, WALTER LESTER, M.D.....8 East Fifty-eighth Street, New York
CHAPIN, HENRY DWIGHT, M.D.....27 West Fifty-first Street, New York
CHRISTOPHER, W. S., M.D.....408 Centre Street, Chicago
CRANDALL, FLOYD M., M.D.....113 West Ninety-fifth Street, New York
EARLE, CHAS. WARRINGTON, M.D., 535 Washington Boulevard, Chicago
FORCHHEIMER, F., M.D.....160 West Ninth Street, Cincinnati
FRUITNIGHT, J. HENRY, M.D..161 West Fifty-seventh Street, New York
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HATFIELD, M. P., M.D.....70 State Street, Chicago
HOLT, L. EMMETT, M.D.....15 East Fifty-fourth Stree', New York
HUBER, F., M.D.....209 East Seventeenth Street, New York
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JACOBI, A., M.D.....110 West Thirty-fourth Street, New York
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LAFLEUR, HENRY, M.D.....58 University Street, Montreal
LATIMER, THOMAS S., M.D.....103 West Monument Street, Baltimore
LOCKWOOD, WILLIAM F., M.D.....201 West Madison Street, Baltimore
MORRILL, F. GORDON, M.D.....181 Beacon Street, Boston
NORTHRUP, WILLIAM P., M.D..57 East Seventy-ninth Street, New York
O'DWYER, J., M.D.....967 Lexington Avenue, New York
OSLER, WILLIAM, M.D.....1 West Franklin Street, Baltimore
PUTNAM, CHARLES P., M.D.....63 Marlboro Street, Boston
RACHFORD, B. K., M.D.....118 East Fifth Street, Newport, Ky.
ROTCH, T. M., M.D.....197 Commonwealth Avenue, Boston
SCHARLAU, B., M.D.....66 West Thirty-fifth Street, New York
SEIBERT, A., M.D.....137 East Nineteenth Street, New York
SHERMAN, T. F., M.D.....25 Rutland Square, Boston
SMITH, J. LEWIS, M.D.....64 West Fifty-sixth Street, New York
SNOW, IRVING M., M.D.....371 Porter Avenue, Buffalo
STARR, LOUIS, M.D.....1922 Spruce Street, Philadelphia
TOWNSEND, CHARLES W., M.D.....61 Chestnut Street, Boston
VAUGHAN, V. C., M.D.....15 South State Street, Ann Arbor
WATSON, WILLIAM PERRY, M.D.....319 York Street, Jersey City
WILSON, J. C., M.D.....1437 Walnut Street, Philadelphia
WINTERS, J. E., M.D.....36 West Thirty-second Street, New York
YALE, LEROY M., M.D.....432 Madison Avenue, New York

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# MINUTES

OF THE

## FIFTH ANNUAL MEETING

OF THE

# AMERICAN PEDIATRIC SOCIETY,

Held at West Point, N. Y., May 24, 25, and 26, 1893.

---

*First Day* (*Evening Session*).—The President, A. D. Blackader, M.D., of Montreal, called the meeting to order at 8.15 P. M., in the parlor of Cranston's Hotel.

The following members were present:

S. S. Adam, M.D., Washington; A. D. Blackader, M. D., Montreal; W. D. Booker, M.D., Baltimore; A. Caillé, M.D., W. L. Carr, M.D., H. D. Chapin, M.D., New York; W. S. Christopher, M.D., Chicago; F. M. Crandall, M.D., New York; F. Forchheimer, M.D., Cincinnati; J. H. Fruitnight, M.D., New York; J. P. C. Griffith, M.D., Philadelphia; M. P. Hatfield, M.D., Chicago; L. E. Holt, M.D., F. Huber, M.D., A. Jacobi, M.D., H. Koplik, M.D., New York; H. Lafleur, M.D., Montreal; W. P. Northrup, M.D., J. O'Dwyer, M.D., New York; W. Osler, M.D., Baltimore; B. K. Rachford, M.D., Newport, Ky.; T. M. Rotch, M.D., Boston; A. Seibert, M.D., J. L. Smith, M.D., New York; I. M. Snow, M.D., Buffalo; L. Starr, M.D., Philadelphia; W. P. Watson, M.D., Jersey City; J. E. Winters, M.D., and L. M. Yale, M.D., New York.

On motion, the minutes of the last annual meeting were approved as published in the ARCHIVES OF PEDIATRICS of July 1892.

On motion, it was ordered that all the papers presented to this meeting, with the discussions thereon, be furnished exclusively to the ARCHIVES OF PEDIATRICS for publication therein, the publishers in turn agreeing to make three hundred reprints thereof for the society, free of all expense, and similar to those furnished at the last meeting.

The President, A. D. Blackader, M.D., then delivered the annual address.

Dr. M. P. Hatfield then read a paper on "This Year's Failures in Diphtheria." It was discussed by Drs. Northrup, Jacobi, Booker, Fruitnight, J. Lewis Smith, Winters, Rotch, Caillé, and Seibert.

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Dr. J. Lewis Smith then read a paper on "The Value of Peroxide of Hydrogen in Diphtheria."

Dr. W. D. Booker reported "A Case of Laryngeal Diphtheria." These two papers were discussed together by Drs. Seibert, Fruitnight, Caillé, and Koplik.

On motion, the society adjourned at 10.30 P. M.

*Second Day (Morning Session).*—The Society was called to order by the President at 9.30 A. M.

Dr. P. J. Crozer Griffith read a paper entitled "Brief Notes on the use of Antipyretic Drugs in the Febrile Affections of Children." It was discussed by Dr. Christopher.

At the request of Dr. Jacobi, his paper on "Intestinal Fever" was read by title.

Dr. T. M. Rotch presented the report of the committee on revision of the nomenclature of gastro-intestinal diseases. After a long discussion, it was moved, seconded, and carried, that the discussion and action on the report be postponed until the next annual meeting.

On motion, it was also ordered that the classification chart presented in the report be printed separately from the transactions, and distributed to the individual members, and that the report and the discussion upon it be omitted in the publication of the transactions.

Dr. Louis Starr then read a paper on "Proctitis in Early Infancy." It was discussed by Drs. Fruitnight, Christopher, Starr, Jacobi, and Koplik.

A paper on "The Plausibility of the Direct Transmission of Tuberculosis to the Fœtus from Either Parent," by Dr. J. M. Keating was next in order, and as its author's ill health prevented his attendance, the paper was read by the Secretary. It was discussed by Dr. Jacobi.

Dr. William Osler read a paper on "Acute Scleroderma," which was discussed by Drs. Northrup, Jacobi, and Koplik.

Dr. T. M. Rotch presented the report of the committee having in charge the revision of the nomenclature of diseases of the mouth.

After a long discussion, it was moved, seconded, and carried that the discussion of this report, and action thereon should be postponed until the next annual meeting.

Dr. Holt moved that every member be requested to send in to the committee his provisional classification of the nomenclature of gastro-intestinal diseases and of dis-

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eases of the mouth before the conclusion of this meeting. Carried.

On motion, the Society adjourned at 1 P. M.

*Second Day (Evening Session).*—The Society was called to order by the President at 8.30 P. M.

The programme of this session embraced two special discussions, one on the Treatment of Pertussis, and the other, on the Treatment of Constipation in Early Infancy. In the discussion on the treatment of pertussis, Dr. J. P. Crozer Griffith considered the local treatment, Dr. F. Forchheimer the constitutional treatment, and Dr. William Osler the climatic treatment; while Dr. H. D. Chapin treated of the complications of pertussis.

Dr. Henry Koplik then read a paper on "Heart-Strain in Pertussis; Its Effects and Treatment," after which there was a general discussion which was participated in by Drs. Holt, Northrup, Fruitnight, Winters, Seibert, Caillé, and J. Lewis Smith.

In the discussion on the treatment of constipation in early infancy, Dr. L. Emmett Holt considered the dietetic treatment, Dr. Le Roy M. Yale the local treatment, and Dr. C. P. Putnam the medicinal treatment. This last paper, in the absence of the writer, was read by the Secretary. A general discussion then followed, which was participated in by Drs. Starr, Fruitnight, and Crandall.

On motion, the Society adjourned at 10.45 P. M.

*Third Day (Morning Session).*—The Society was called to order by the President at 9.15 A. M., and a business meeting was held previous to the regular scientific session.

Dr S. S. Adams, speaking for a committee appointed to find a depository for the transactions of the Society, said that he had communicated with Drs. Billings and Fletcher regarding this matter, and had been informed that it was probable provision could be made for keeping the library of the Society as articles of reference, but permission could not be given to remove them subsequently.

On motion of Dr. Hatfield, the report was accepted, and the committee was continued.

In the absence of the Treasurer, Dr. Charles W. Townsend, his report was read by Dr. Rotch, and the President appointed Drs. Northrup and Huber a committee to audit the accounts.

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The Council reported the following nominations to office and membership:

President, John M. Keating, M.D., of Colorado Springs; First Vice-President, F. Forchheimer, M.D., of Cincinnati; Second Vice-President, A. Caillé, M.D., of New York; Secretary, S. S. Adams, M.D., of Washington, D.C.; Treasurer, Charles W. Townsend, M.D., of Boston.

Member of Council.—J. P. Crozer Griffith, M.D., of Philadelphia.

Membership.—W. F. Lockwood, M.D., of Baltimore; J. W. Acker, M.D., of Washington, D.C., and F. Gordon Morrill, M.D , of Boston.

The Council also called attention to the fact that next year the Society would meet with the Congress of American Physicians and Surgeons in Washington, D. C.

The Council recommended that the question of expediting the publication of the transactions be discussed, and suggested that it might be advantageous to appoint an editor.

Dr. Holt moved that all the papers given for publication in the transactions should be published within three months after the meeting of the Society. Seconded.

Dr. Watson explained that the June number of the ARCHIVES OF PEDIATRICS was already nearly through the press, and the July number was more than half in type, so that if this motion were carried out it would be necessary for him to withdraw the offer already made regarding the publication of the transactions.

Dr. Northrup moved to amend Dr. Holt's motion so that it would read: All the *stated* papers shall be published within five months from July 1st, in the order decided upon by an editor appointed by the Society, and that thereafter shall follow at the discretion of the editor all the papers which consist of reports of individual cases. Seconded. Carried.

Dr. Adams moved that the Council appoint an editor. Carried.

The Council then appointed Dr. Floyd M. Crandall.

The Secretary then read the following communication from the Executive Committee of the Congress of American Physicians and Surgeons:

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EXECUTIVE COMMITTEE OF THE CONGRESS OF AMERICAN PHYSICIANS AND SURGEONS.

SECRETARY'S OFFICE,
No. 28 East Thirty-Eighth St., New York,
April 18, 1893.

SAMUEL S. ADAMS, M.D.,
SECRETARY AMERICAN PEDIATRIC SOCIETY.

*Dear Doctor:* I beg to call your attention to the following extracts from the Minutes of a meeting of the Executive Committee, held at the residence of the President, Dr. Loomis, on March 17, 1893:

"It was moved by Dr. Loomis and seconded by Dr. Taylor, in place of the arrangement of former congresses, that three afternoons and one evening of the Third Congress be given, in sessions of one and one-half hours each, to seven of the fourteen participating organizations; and that each society selected to perform this duty prepare its own programme for the period assigned it by the Committee and select its own speakers: Carried."

The selection of the Societies, under the resolution, to prepare programmes for the Third Congress, was made alphabetically as follows: (1) Anatomists, (2) Climatologists, (3) Dermatologists), (4) Genito-Urinary, (5) Gynæcologists, (6) Laryngologists, (7) Neurologists.

The Ophthalmologists, Orthopædists, Otologists, Pediatrists, Physicians, Physiologists and Surgeons, under this rule will prepare programmes for the Fourth Congress.

"It was then moved and seconded that each Society be held responsible for the period allotted to it by the Committee, and that each Society be empowered to invite members of other participating organizations to take part in its proceedings: Carried"

"It was then moved that the Secretary of the Committee notify each participating organization of the action of the Committee, and that he call the *especial attention* of the *seven Societies selected* to prepare programmes for the coming Congress to *their duties under the foregoing resolutions:* Seconded and Carried."

"It was then moved that the Secretary of each Association selected to prepare programmes for the coming Congress, *report immediately after the next meeting of their respective Societies* to Dr. Wm. H. Carmalt, New Haven, Conn., in order to facilitate the *preparation* of the *official programme* of the Congress: Seconded and Carried"

It was further resolved that the allotment of the seven selected Societies to the seven periods of time be referred with power to a Committee composed of the President and Secretary of the Congress and the Chairman and Secretary of the Executive Committee. These officers were also made a Standing Committee to arrange the details of the Congress.

It was decided to hold the Congress in Washington, D.C., on the last Tuesday in May, 1894, and the three succeeding days.

By order
NEWTON M. SHAFFER.
Secretary Executive Committee.

On motion, the Secretary was instructed to formally acknowledge the receipt of this communication.

On motion of Dr. Adams, the matter of inviting such guests as the Society desired to have present at the Congress was referred to the Council.

Dr. Holt, on behalf of the Council, announced the following special topics for discussion at the next meeting:

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(1) The Nomenclature of Intestinal Diseases. (2) The Ætiology, Prevention, and Treatment of Rhachitis.

Dr. Northrup on behalf of the Auditing Committee reported that they had examined the Treasurer's accounts, and had found them correct.

On motion, the report was accepted.

In order to facilitate the work of the committee on nomenclature of Gastro-Intestinal Diseases, on motion of Dr. Caillé, it was decided that the committee should be asked to drop the word "dysentery" from their nomenclature.

## *Scientific Session.*

Dr. H. D. Chapin presented a new antiseptic—Bismuth Naphtho-Hydrate, which had been prepared by the apothecary of the Demilt Dispensary, New York, Mr. Lascar.

Dr. Chapin then read a paper on "The Preservation of Cow's Milk." It was discussed by Drs. Seibert, Rotch, Koplik, and Caillé.

Dr. Irving M. Snow read a paper on "A Gastric Neurosis in Childhood," which was discussed by Drs. Holt, Christopher, Rotch, Seibert, Koplik, Forchheimer, and Caillé.

Dr. B. K. Rachford then read a paper on "The Ætiology of Incontinence of Urine," which was discussed by Drs. Rotch, Crandall, Adams, Griffith, and Christopher.

Dr. L. Emmett Holt then read a paper on "Meningitis Complicating Pneumonia." It was discussed by Drs. J. Lewis Smith and Rotch.

Dr. F. Forchheimer read a paper, entitled "The Treatment of Certain Forms of Anæmia in Children." It was discussed by Drs. Caillé, Griffith, and Koplik.

A paper by Dr. Floyd M. Crandall on "A Clinical Study of Rheumatism in Children," was read by title.

Dr. Walter Lester Carr reported a case of "Sarcoma of the Back in a Baby."

At the request of Dr. J. Lewis Smith, his paper on "Some Points in Connection with the Ætiology of Rhachitis," was read by title.

Dr. J. Henry Fruitnight read a paper on "The Treatment of Rhachitis with the Lacto-Phosphate of Lime," which was discussed by Drs. Seibert, Rotch, Winters, and Caillé.

On motion, the meeting adjourned at 1 P. M.

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*Third Day* (*Afternoon Session*).—The meeting was called to order by the President at 2.15 P. M.

Dr. Samuel S Adams reported "A Case of Erysipelas of the Scalp and Face in an Infant, aged Six Weeks; Recovery." It was discussed by Drs. Holt, Seibert, and Hatfield.

Dr. F. Huber reported a case of "Abscess of the Lung in an Infant, Aged Thirteen and-a-half Months; Operation; Recovery." It was discussed by Drs. Holt, Rotch and Winters.

Dr. Northrup's paper was, at his request, read by title on "The Care of the Throat and Ears in Children."

Dr. Rotch gave a "Description of a New Incubator." Remarks were made by Drs. Caillé and Holt.

Dr. Adams moved that the President express to the manager of the hotel the Society's appreciation of his efforts to make the visit a pleasant one. Carried.

Dr. Adams then moved the thanks of the Society be tendered to the retiring President for the great efforts he had put forth to make this meeting successful, and also in token of its appreciation of the fairness and courtesy which he had exhibited as its presiding officer. Carried.

On motion, the Society adjourned at 3 P. M.

WILLIAM PERRY WATSON, M.D.,
*Recorder.*

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# THE PRESIDENT'S ANNUAL ADDRESS.

BY A. D. BLACKADER, M.D.,

Montreal.

GENTLEMEN :—In opening the fifth annual meeting of our Society, my first thoughts are to express to the members my appreciation of the honor, which, as a Society, you have conferred upon me. I am aware how unfitted I am to fill this chair acceptably after the very able men who have preceded me, your former presidents, who, by their previous works and writings, as well as by their tenure of this office, have honored our Society. I am deeply conscious also that there are many present today more worthy than myself of holding this position. I recognize, however, that in conferring the compliment, you have very courteously overlooked my own shortcomings, and generously sought to honor your comparatively weaker neighbor to the North. As a Canadian, therefore, I thank you for your goodness, and I desire to take this opportunity of expressing what, as Canadian physicians, we all feel, namely, the uniform courtesy, kindness, and generosity, that we have ever experienced at the hands of our American *confrères*. Canadian universities and socie-

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ties have been recognized fraternally by you in your many medical gatherings, both East and West, and to their representatives has always been extended a more than cordial welcome. Permit me, therefore, on behalf of my Canadian brethren, to express our sense of obligation, and to hope that ere longs this Society will do us the pleasure and honor of visiting at its annual meeting our northern metropolis.

The comparatively long programme before us might be a sufficient excuse for the omission of the few opening remarks that I may be able to offer this evening : it is an excuse of which, for your sakes, I should willingly avail myself, but I fear that I have no precedent. Custom, with voice sounding through the decades, demands this task of those occupying the chair.

This is the fifth year of our existence as a Society, and it may not be amiss at the outset to pass in brief review the work which has been accomplished in its half decade of existence. Such a review will enable us to form a correct conception of the position which the Society is filling in the medical world, and may form the basis of a few tentative suggestions as to special work in the future.

During the past four years we have had presented to our Society fifteen papers on diseases connected with the respiratory system. Among the more important of these we would mention the very valuable series on the diagnosis of the pneumonias of infancy ; an interesting contribution to our knowledge of the bacterial origin of empyæma ; an essay on the causes of noisy respiration ; a description of intubation and the O'Dwyer tubes, and of a method of making forcible artifical respiration. We have also had discursive papers on noteworthy cases of empyæma, abscess of the lung, membranous laryngitis, laryngismus, and syphilitic broncho-stenosis. Gastro-intestinal disease in infants has very deservedly occupied a prominent place in our discussions, eight papers having been given to its consideration. Here, too, we can point with much satisfaction to the contributions which have been made by members of our Society. Papers by

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Booker, Jeffries and Vaughan on the ætiology of summer diarrhœa, have brought light where previously there was gross darkness, and have afforded a scientific basis for our management of this scourge of infant life. Its clinical course and treatment, especially the mechanical treatment by lavage of the stomach and large bowel, have also been carefully discussed in a series of papers, which have materially added to our practical knowledge.

It is to the first president of our Society that the honor is due of having suggested many years ago, in connection with infant feeding, the sterilization of milk by boiling, and its after-preservation in tightly-stoppered bottles; and although to Professor Soxhlet, of Munich, may be accorded priority in the publishing of his investigations on the bacterial contamination of milk and of inventing a mode of overcoming it, yet it is to members of our Society that most of the recent advances in this department are due. In this subject America is in the vanguard of the medical world. In the milk laboratories, as shown to us in Boston last year, surely we have at last reached a practical realization of our aspirations—a Pasteurized milk with its various ingredients duly proportioned to meet the wants and digestive powers of the infant, and supplied in correct amounts for each regular feeding.

In connection with this subject of infant feeding, you will also remember the interesting paper on the management of those cases where breast milk disagrees, and two very valuable communications—the first, dealing with the capacity of the infant stomach; the second, in reference to the clinical examination of breast milk.

Scarlet fever and diphtheria, unfortunately ever present with us, have claimed full attention from our Society. The means of prophylaxis have been discussed in papers, which received considerable notice from the general medical press. The complications, especially scarlatinal nephritis, and the treatment have also formed the subject of several important communications. Among other methods advocated in the way of treatment, the submembranous injection of a solution of chlorine in pharyngeal

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diphtheria and the ingenious syringe, by which the injection is made, require distinct notice. In the bacteriological field connected with these diseases, two important communications were made last year—one on the relation of pseudo-diphtheritic angina to diphtheria, with special reference to scarlatinal pseudo-membranous angina; the second on forms of diphtheria, which simulate simple angina. Both of these were of much value to general medicine, not only for the new facts which they brought to light, but also in that they emphasized the need of greater caution in our diagnosis of the several forms of angina.

Typhoid fever in infancy and childhood formed the subject of three papers, which elicited last year a very full discussion. During this discussion an important statement was made in reference to the frequency with which are met with swollen Peyer's patches and enlarged mesenteric glands in the post mortem examination of infants apart from the specific poison of typhoid; a fact which must distinctly modify in the future our diagnosis upon this ground of infantile typhoid fever. The manifestations of influenza in children have also claimed our attention. In addition to the above, valuable papers on the following subjects have been presented to our Society: Results of Asphyxia immediately after Birth; on the Association of Congenital Wry Neck with Marked Facial Asymmetry; on Sclerema Neonatorum with the Report of a Case; Tuberculosis of the Testis in the Infant; on Spurious Meningocele, Traumatic Cephalohydrocele, Acquired Cephalocele; on the Early Diagnostic Symptoms of Tubercular Meningitis; Carpo-pedal Contractions, One Manifestation of Tetany; Aneurism in Early Life; on a Clinical Study of Heart Disease in Children; on Acute Primary Nephritis in Infancy; on Chronic Nephritis in Children and Young Adults; Perityphlitis in the Young; on Ulcerative Catarrhal Dysentery; on the Ætiology of Aphthous Stomatitis; on Some Manifestations of Rachitis in Children; on the Anæmia of Tuberculosis; on a Remarkable Epidemic of

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Alopecia Areata; on Dactylitis in Children; and a series of papers on the Relation of Rheumatism and Chorea.

The history of many interesting cases has also been given to the Society. Among the more important being the following: A Case of Hydrorrhachis, Club Feet, Congenital Luxation of both Femora; Two Fatal Cases of Congenital Pernicious Jaundice in the Same Family; a Case of Sporadic Congenital Cretinism; American Cases of Scurvy in Infants; a Case of Diaphragmatic Hernia with Operation; Acute Peritonitis Following Vulvo-Vaginal Catarrh in a Child of Seven Years, Simulating a Perforation of the Appendix; a Case of Suppurative Peritonitis; a Fatal Case of Purpura; a Case of General Subcutaneous Emphysæma; Prolapse of the Rectum, Due to Large Stone in the Bladder of a Child Three and a Half Years Old—Removal—Cure; Two Cases of Spastic Paraplegia in the Same Family; a Case of Ataxia in a Child of Twelve Years; Two Cases of Nystagmus Associated with Choreic Movements of the Head in Rachitic Babies; a Case of Tubercular Osteitis of the Hips Originating in Colorado; Three Particularly Interesting Cases of Malformation of the Heart; a Case of Sacro-coccygeal Tumor in a Child of Three Weeks; a Case of Sarcoma of the Kidney; Exhibition of Several Pathological Specimens. Besides the above, five papers have been presented bearing specially upon therapeutics.

Gentlemen, such has been our record for the past four years. Can any other society show a wider range of subjects under discussion? Or cases treated from a broader point of view? And yet we are told that we are specialists, and that as specialists we have but the leavings of our other *confrères* in specialism. To some extent, I suppose, we must admit the term in so far as it recognises the definite peculiarities of the child's constitution, and emphasizes the requirement of much necessary training and study, and considerable natural tact, in the physical examination of a sick child; but let us feel thankful that our horizon is bounded by no petty local limits, and that our view is necessarily broad, and must include all medicine

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and a certain amount of surgery. Moreover, owing to the fact that most of us are also largely occupied with general medicine, have we not a distinct vantage ground over the so-called pure physician ? For disease cannot be fully studied from its manifestations in adult life only. The complete picture must include the earlier manifestations in the developing organisms of the infant and child, as well as the perhaps more prominent symptoms that we meet with in the adult, and its final appearance in the decrepitude of age. To use the words of a recent writer on the subject: "Disease as it manifests itself at one age and at the other, does but complete the picture of the one disease." While another pediatrist writes: "No disease can be said to have been fully observed until traced back to its source in early childhood."

To take an example well recognized by us all, let us consider the picture presented by the rheumatic diathesis. We are all too familiar with the explosion of an attack of acute rheumatism as met with in the young adult, associated or followed, as it often is, by a disabling endocarditis; its earlier manifestations in a recurring tonsillitis, or an attack of erythæma are also very generally recognized, but is this all ? Has this completed the picture, or may we still further add to it ? I shall not speak of chorea for its relations with rheumatism have been so lately discussed in our Society, and their connection would appear to be better described as one of an allied pathogenesis in early life than as etiologically being dependent the one upon the other; but should not some of the pleurisies met with in childhood be regarded as in great part dependent upon the presence of this diathesis; and may not that blighting affection of early nervous life, acute anterior polio-myelitis, be also, as suggested by Dr. Goodhart, in some measure dependent upon this same constitutional tendency ? Allied to some extent with the rheumatic diathesis is the uric acid diathesis, which only recently has been recognized as in any way a disease of childhood. There would indeed appear to be in some cases a very close connection between the manifestations

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of these two in early life, as we occasionally meet with a patient who in his childhood suffered from what was looked upon as acute rheumatism, but who in later life presents unequivocal evidences of gout. This statement was made first by a recent writer, but I have seen it verified in my own experience.

Very recently, also, quite an important group of symptoms, met with in childhood, has been attributed by Dr. Sutherland, of London, to the presence of this excretory product. In children, the subjects of this diathesis we, find keen, precocious minds, small, restless bodies, and an excitable nervous system. Such are said to be poor sleepers and bad eaters, liable to frequent catarrhal attacks affecting principally the nasal, pharyngeal, gastric, and intestinal mucous membranes. Renal colic is not uncommonly met with, but generally passes unrecognized, being mistaken for stomach ache. Some of our more intractable cases of incontinence also appear to be dependent upon the acid condition of urine met with in this diathesis, and cases of cyclic albuminuria have been referred to this same acid state of the night urine in these children, as compared with the more alkaline and less irritating condition of that passed by day. In this connection the question has been raised, whether, if we could study the life history carefully, we might not find that many of these cases of early irritation terminated in later years in organic disease. Still further, recurring attacks of appendicitis in children, commencing at first as a simple catarrhal inflammation, but leading in many cases to perforation and subsequent general peritonitis, have been attributed by the same author to the presence of this constitutional dyscrasia as a predisposing factor.

As pediatrists and general physicians, have not these pictures of the early manifestations of constitutional disease, if verified by future observations, very important bearings for us, not only as affording us a vantage ground for more definite treatment during childhood, but as possibly permitting us to anticipate, and prevent the later and less amenable manifestations of adult life ?

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To the same end, the question has been asked what are the earliest manifestations of the asthmatic habit, of migraine, and of the hundred and one neurasthenic and dyspeptic conditions which, as met with in adult life, so sorely perplex the practitioner? May we not yet be able to recognize sufficiently early the presence of certain symptoms which shall warn us, and possibly forearm us, against the intractable adult form of the disease? It may yet be that beginning at this early age our therapeutic efforts will be crowned with complete success. That we may attain this result, it seems to me that we cannot put too much value upon carefully kept notes of what may appear to us at the time, even the petty ailments of infancy and childhood, biding our time and reading them in after years in the fuller light of the developments of adult life. In this way only can we acquire the coveted knowledge, and become able to interpret the so-called lesser ailments of child life, in the light, not of what they appear to be, but of what they may become. Verily the child is father of the man in his disease history as well as in other important respects. In all departments of medicine, prevention in the eyes of the true physician is daily occupying a more and more important field, and surely in no sphere can more important results be obtained, than in checking the developing tendencies of child life.

While thus disclaiming the fact that we are specialists, in a sense implying any narrowing of our field of thought or labor, we would nevertheless from a practical point of view magnify our specialism. Definite knowledge and acquired skill, much more than natural tact, are required in the examination of a sick child. As consultants, are we not all conscious of the frequency with which even otherwise good practitioners fail utterly to obtain definite knowledge of the ailments in sick children? Does not this indicate the necessity of special instruction in this subject in our medical schools? As pediatrists, should we not occupy a very definite place in the medical curriculum? The subject of diseases of children should not be an optional one with the student. Every medical

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school should have a special out-door department for the training of the student in the examination of a sick child, and pediatry should claim definite recognition in both the clinical and written examinations.

Our branch of general medicine will make due progress only when every student leaves our halls properly qualified to observe, and duly impressed with a sense of the importance of the ailments of child life.

In this way we shall contribute our share, and that no mean share, to the erection of the perfect temple of scientific medical knowledge. To this shall all specialism contribute, and the finished work be blended in one harmonious structure whose far-reaching wings shall extend towards all departments of life, and from whose portals shall emanate beneficial influences which shall raise the physical, and with it the mental and moral, standard of mankind at large.

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# THE VALUE OF PEROXIDE OF HYDROGEN IN DIPHTHERIA.

BY J. LEWIS SMITH, M.D.,

New York.

OF the medicines which have been recently added to the long list of remedies for diphtheritic and other forms of microbic inflammation of the fauces and nares, the peroxide of hydrogen is one of the most important. It was brought prominently and favorably to the notice of the profession by Dr. E. R. Squibb in a paper read before the Kings County Medical Association on February 5 1889, and published in Gaillard's Medical Journel. in the following month, Dr. Squibb wrote as follows: "Throughout the discussion upon diphtheria, very little has been said of the use of the peroxide of hydrogen or hydrogen dioxide. Yet it is perhaps the most powerful of all disinfectants and antiseptics, acting both chemically and mechanically upon all excretions and secretions, so as to change their character and reactions instantly. The few physiciahs who have used it in such diseases as diphtheria, scarlet fever, small-pox, and upon all diseased surfaces. whether of skin or mucous membrane, have uniformly spoken well of it, so far as this writer knows, and perhaps the reason why it is not more used is that it is so little known, and its nature and action so little understood." The recommendation of so distinguished a pharmacist, favorably known throughout the country, directed the attention of the profession to the peroxide, and it was soon prescribed by many physicians in diphtheria and scarlet fever.

The only correct test of a mebicine is clinical observation, and it was soon found that the praise bestowed on the peroxide by the pharmaceutical chemist was not fully justifiep. Samples of the peroxide were found to be

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highly irritating, so that even a fifteen-volume solution, diluted with two or more times its bulk of water, applied by spray or otherwise, increased the inflammatory hyperæmia of the nasal, buccal and faucial surfaces, sometimes causing in addition to the increase of inflammation a pellicular exudation of fibrin, as when a caustic-like strong ammonia is used. It will be recollected that the new drug received a strong set-back at the last meeting of the American Pediatric Society, when distinguished members of this societo. whose opinions influence the belief and practide of the medical profession in both hemispheres, related cases showing the pernicious effects of the peroxide. In my own practice I have sometimes witnessed good and sometimes witnessed bad results of the use of the fifteen-volume peroxide, diluted with two or three times its bulk of water, results such as the raw beef appearance of the fauces and mouth, continuing as long as the medicine was employed, and in three instances the thin fibrinous film was observed. I have witnnessed also a dangerous symptoms, to wit: marked hoarseness, continuing as long as the peroxide was used, and indicating a catarrhal inflammation of the upper air passages, apparently produced by the inhalation of the vapor of the peroxide from a hand atomizer. The members of this society need not be told of the danger attending a catarrhal inflammation of the larynx in diphtheria since it is likely to be transformed into a pseudo-membranous and fatal diphtheritic inflammation. The irritating property of the peroxide of hydrogen has been, I suppose, correctly attributed to the acids,sulphuric and phosphoric, used in its composition. I find that the fifteen volume solution of Marchand requires five grains of sodium bicarbonate to render one ounce neutral, that of the Oakland Company three grains, and the ten or eleven volume of Squibb's two and one-half grains of the sodium to render one ounce neutral.

Although the strong impression of this society in regard to the irritating and consequently injurious effects of the peroxide have been known by the manufactures

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as soon as they were published in the medical journals, yet the fault complained of still continues in certain preparations. Thus about six weeks ago I prescribed a fifteen volume preoxide diluted with ten times its bulk os water, to be used upon the fauces in a case of influenza. Even this dilution caused so much smarting that I found at my next visit that it had been used only once. I ascertained that it came from a laboratory that had deen extensively advertising their peroxide during the last two or three years.

It is important for the physician to determine whether the irritating property of the peroxide is necessary, or whether it may not be removed without loss of the germicide and antiseptic action of this agent. If it be necessary then there will always be a valid objection to the use of the peroxide. That some specimens are more irritating than others, probably from hyperacidity, is abundantly shown by clinical observations as well as chemical tests. Dr. T. R. Espey states that he had employed the peroxide in several cases with good results, prescribed as a throat wash, diluted with an equal quantity of water, and applied with the atomizer. A patient thus treateb had nearly recovered, only a slight membrane remaining on one tonsil and presenting a rotten appearance as if about to be detached. Unfortunately at this time the retail druggist received a new supply of the peroxide, made dy a differsnt chemist. When this was used in the atomizer, the child, who had been docile and quiet under the treatment, cried with pain. Espey was sent for in haste. He found a thin, grayish membrane covering the tonsils, uvula and posterior pharynx, and the buccal surface was red and angry-looking. Dr. Espey gargled his own throat with the medicine. and experienced a sharp, burning pain. and he states that his "teeth were set on edge by the solution." Now such experiences as those related by Espey, and as those detailed to this society one year ago, I believe,have not been unusual, when the peroxide most widely advertised has been used ans with little dilution.

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Physicians summoned to cases of diphtheria are greatly in need of a prompt and efficient germicide and antiseptic, which can be used immediately and freely without fear of poisonous or dangerous consequences. Corrosive sublimate has been, as we know, widely used in diphtheria in the belief that it promptly destroys the microbes which cause the disease, but being an active poison it is a dangerous remedy Two prominent New York physicians have informed me that they have witnessed fatal results from this medicine. I might add one case to theirs. Even Lister, I am informed by a New York surgeon, has abandoned the use of corrosive sublimate.

Believing that a useful and important remedy may be rejected by the medical profession from carelessness in its preparation, and that the caustic properties in the peroxide, which have been so injurious, might be accidental and not necessary, I wrote for information to the pharmaceutical chemist, who above all others has the confidence of physicians in America, Dr. Squibb, of Brooklyn. In his reply he writes:

"I don't believe that any of the observers have in reality either condemned or extolled dioxide of hydrogen, but only such solutions of it as may have deen supplied to them at the time of observation. These solutions have all, so far as I know, been made in a very loose, crude way, chiefly for bleaching purposes, and are liable to many impurities. Then it is a very unstable article, and its instability varies much with its impurities, and the care, or want of care, with which it is made and kept." Squibb's statement of the mode of preparing the peroxide, which he has kindly sent to me along with the material used, covers six pages. We would expect that in the haste and carelessness so characteristic of American work, and in the endeavor to be first in the market to supply the demand, that a medicine requiring so much care and so many detaiis in its preparation, would often be improperly made and liable to do harm. I suppose that, as Dr. Squibb states, this has often been the case with the peroxide.

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But yet, in fairness, both sides should be heard. We find in the Boston Medical and Surgical Journal, September 29, 1892, a paper from Dr. F. H. Williams, in which he recommends for use in diphtheria a much stronger peroxide that that commonly employed. He says: "I found that in the laboratory all the bacilli were killed after ten seconds contact with a fifty-volume solution, and that this solution did no harm to the tissues, and as a rule caused little inconvenience to the patient." Williams states that whear the exudate is tough and thick, the use of a 50 to 200 volume is preferable, but as he applies it, it probably acts as a caustic, like the caustic applications of Bretonneau and Trouseau. He has constructed a syringe with a fine point, which he inserts into the pseudo-membrane, and presses out a few drops. "Immediately," says the writer, "there appears a frothy swelling, and the patient expectorates a white froth. The membrane then, in some cases, looks swollen, white and thickened, and it is not until about one hour later that the most marked improvement is appearent." "This," he adds, "should be done from one to three times in the first day or two only." It will be observed that 50, 100, or 200 volume peroxide employed by Dr. Williams is only a few drops inserted into the pseudo-membrane in the first forty-eight hours. It is evident that if Dr. Williams employed the peroxide, which has been most widely advertised, and until lately most extensively employed, the few drops used destroyed that part of the diphtheritic exudate with which it came in contact, and if it extended far enough, also the underlying tissue, as has many times been done in hospitals and elseware by the application of caustic agents, its limitation to a few drops and to the pseudo-membrane prevented such a result.

Again at the forty-third meeting of the American Medical Association, held in Detroit in June, 1892, Dr. George E. Fell related a case of tracheotomy and said: "Regarding the peroxide of hydrogen its value was unquestioned. It produced liquefaction of the membranes in the throat, but whether a weaker solution would have

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proved more satisfactory I am not prepared to state." The peroxide of about volume thirty-two was used.

That such strong solutions have been used without pain or smarting or any ill effect is remarkable, and is, I think, to be explained by the fact that the peroxide is very unstable, and that it had deteriorated, or that there was a large amount of exudate present, which to a considerable extent protected the mucous surfaces.

Since the acid, sulphuric, phosphoric, or both, seems to be the irritating agent in the peroxide, it has occurred to me that inasmuch as 5 grains of the sodium bicarbonate neutralize one ounce of the Marchand 15 volume peroxide, 3 grains one ounce of the Oakland Company 15 volume peroxide, and 2 1-2 grains, one ounce of Squibb's 10 or 11 volume peroxide, the peroxide might be rendered neutral without diminishing its efficiency by adding the requisite amount of an alkali immediately before its use. In order to obtain information in this matter of neutralizing the peroxide, I wrote to Dr. Squibb, who replied as follows: "It is quite necessary that solutions of hydrogen dioxide should be slightly acid when they are to be kept for even a very few hours. If neutral or alkaline they will decompose at the rate of some two or three volumes a day, at ordinary temperatures, and faster the warmer the weather, and the stronger solutions would soon burst any ordinary bottles. Your proposition to add the sodium bicarbonate is all right, provided this be done very near to the time of using; then by ordering the strength a little stronger than you want to compensate the loss by decomposition, you could get a fairly uniform solution, for say six or eight hours, after the sodium has been added, provided the bottle be kept in a cold, dark place."

Therefore the irritating action of the peroxide may be prevented by adding to it the sodium bicarbonate in the sick room immediately before its use in quantity sufficient to neutralize it as ascertained by litmus paper, and by so doing its germicide and antiseptic properties do not appear to be lost. Thus the 10 volume solution

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of Squibb, rendered neutral by the sodium bicarbonate at the time of using, and mixed or not with an equal quantity of water, can probably be applied to any of the mucous surfaces, except the conjunctiva without pain or injury, and with benefit in appropriate cases. During the last two or three I have uniformly prescribed for spraying the fauces hourly or every two hours the following :

| | | |
|---|---|---|
| ℞ | Squibbs' Peroxide of hydrogen | ʒ ii. |
| ℞ | Sodii bicarbonates, grains | x. |
| | Aquæ destillat. | ʒ ii. |
| ℞ | Aquæ destillat. | ʒ ii. |

One teaspoonful of each to be mixed in the bottle of the hand atomizer, immediately before its use. The nostrils may be sprayed with the same, with the addition perhaps of two teaspoonfuls of water.

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# AS TO THE ÆTIOLOGY OF PRIMARY PSEUDO-MEMBRANOUS INFLAMMATION OF THE LARYNX AND TRACHEA, WITH REMARKS ON THE DISTRIBUTION OF DIPHTHERIA BACILLI IN ORGANS OF THE BODY DISTANT FROM THE SEAT OF LOCAL INFECTION.

BY WILLIAM D. BOOKER, M.D.,

Baltimore, Md.

THE existence of fibrinous croup as a distinct disease has long been a fruitful theme for discussion, and so recently as last year Henoch stated that from a clinical standpoint he must for the present hold to the opinion of a true inflammatory croup. On the other hand, it has been the belief of many that pseudo-membranous affection of the larynx does not exist as a distinct disease, but is due to diphtheric infection, and that true diphtheric inflammation of the larynx may occur without any of the parts of the throat being involved in the process,

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many cases have been reported in support of this view. But, naturally, exact diagnosis could be afforded only by bacteriological methods, and these had to be resorted to in order to obtain a solution of this problem, and in this direction the evidence has not been disappointing.

The following case, which occurred in my service at the John Hopkins Hospital Dispensary, furnishes valuable information on this subject:

Maggie S., three years old, was brought to the dispensary on the morning of April 6, 1893, complaining of cough and croupous breathing. The croup commenced suddenly on the night of April 3d, and had continued without perceptible change up to the time when she applied to us for treatment. The mother stated that the child had been under the care of a physician during the whole winter for troublesome bronchitis, but had showed no symptoms of this disease for the past three weeks.

*Present Condition.*—Well grown and fairly well nourished. Good color in the face, and no appearance of suffering or of serious illness. Breathing loud and "croupy," but not materially obstructed, and not accompanied with recession of soft parts of the thorax. Bronchial râles numerous over all parts of the chest; no tabular breathing; percussion resonance clear. Throat appeared normal in every respect; no increased redness, swelling, or deposit could be detected in any part of the throat.

In going to and from the dispensary, a distance of nearly one mile, the child was exposed to high winds and to an atmosphere filled with dust.

At 4 P.M., three hours after returning from the dispensary, the symptoms became suddenly alarming; the child had great depression, was breathing with difficulty, suffering intensely for want of air, and changing position almost incessantly. Intubation was performed at 5 P.M., affording instant and perfect relief. Milk and whisky were afterwards swallowed easily, and caused but little irritation. The cord was removed from the tube in an hour, and a culture on boiled egg made from it gave negative results.

April 7th, the child appeared worse; respiration 80 to the minute; bronchial râles more numerous, and bronchopneumonia suspected; percussion resonance clear. Throat free from inflammatory appearance. Cultures from the throat gave no diphtheria bacilli.

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April 8th, decided improvement, and some inclination to play with toys; color of face good; pulse good. Throat still free from inflammation, and indeed from any abnormal appearance.

April 9th, toxic symptoms manifest; pulse feeble; face pale; respiration frequent and labored; tendency to stupor. Intubation tube was removed, but it was not followed by any improvement of the respiration.

April 10th, death at 11 A.M. Autopsy at 11.40 A.M. Notes dictated by Professor Welch.

Body still warm, not emaciated, fair amount of subcutaneous fat. No excess of fluid in thoracic or abdominal cavities.

Tonsils, pharynx, uvula, soft palate, and anterior surface of epiglottis not swollen, and absolutely free from exudation.

The mucous membrane of the larynx, trachea, and primary bronchi is coated with a grayish-white false membrane, in some places nearly one mm. in thickness. Above, it is not easily separable from the mucous membrane, but in the bronchi it exists as a loosely adherent membrane. This membrane begins sharply at the upper margin of the posterior surface, but does not extend at all upon the anterior surface of the epiglottis.

Cervical lymphatic glands much swollen, especially on the left side. Here some are nearly 2 cm. in diameter, and some present minute grayish-white areas in both cortex and medulla.

Bronchial and anterior mediastinal glands are also much swollen and present the same small, gray areas.

The submaxillary glands are perhaps a little swollen.

Thyroid and thymur glands show nothing abnormal.

*Lungs.*—Left: Old adhesion between the lobes, and a few between the costal and visceral pleuræ. At the base of the lower lobe their are areas of bluish-red color, slightly elevated, devoid of air, nearly smooth of action, with here and there small grayish nodules. From the bronchi in these areas opaque muco-pus can be squeezed. These areas measure from 3 to 4 cm. in diameter. Similar areas are found in the upper lobe near the root of the lung, and some few elsewhere in the lung. Grayish translucent tubercles, single and coalescent are found in the lung, especially at the posterior part of the lower lobe. Some of these have coalesced around the bronchi, giving rise to caseous peribronchitis. In the periphery of these nodules there is no evidence of inflammatory

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exudation. Coal pigment occurs under the pleura and through the lung to a slight extent.

Right lung: Adhesions between the lobes, and some between the parietal and visceral pleuræ. There is consolidation of the anterior half of the middle and of the inferior third of the lower lobe; there is also some consolidation in the inferior and posterior part of the upper lobe. There is a very slight fibrinous exudation over these areas on the pleura. The consolidation looks reddish, with grayish, finely granular, more elevated areas apparently corresponding to lobules and to groups of lobules. This lung also contains scattered miliary tubercles. The small bronchi are filled with muco-pus, the larger ones with fibrinous casts. These moulds of the bronchi extend into the smaller bronchioles, and often occlude them.

The spleen is soft, and this organ, as well as the liver, contains a few miliary lubercles. Nothing especial is to be noted in the other organs of the body.

*Frozen Sections.*—From consolidated lung areas show the bronchi filled with leucocytes, the bronchial walls swollen and infiltrated with round cells; neighboring alveoli filled with inflammatory exudate, consisting chiefly of round cells, some larger than others, some pigmented cells, and a little fibrin.

The heart muscle had undergone a diffuse, fine, fatty, degeneration; no hyaline fibres to be seen.

*Liver.*—Exquisite, general fatty degeneration of Kupffer's cells; besides there are more or less diffuse areas in which there has been fine fatty degeneration. A section through one of the grayish-white nodules shows a typical miliary tubercle with epitheloid cells in the centre, and lymphoid cells in the periphery.

*Examination of Hardened Sections.*—Dictated by Dr. Barker. Larynx and trachea: Alcoholic specimens stained in the usual way with hæmatoxylin and eosin showed well the pseudo-membrane on the surface and the necroses of the underlying tissues. Sections stained in picro-carmine and subsequently treated by Weigert's method for the demonstration of the fibrin and bacteria were most instructive. The fibrin is chiefly coarse, although some finer bands are present. In its meshes, especially near the surface of the membrane, are numerous cells, many nuclear fragments with intensely staining chromatin and bacilli. The cells are chiefly leucocytes with polymorphous nuclei, but there are besides numerous

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small mononuclear cells. The mucous membrane is completely necrotic, and the epithelium is no longer distinguishable. Diphtheric bacilli are very numerous in some parts of the membrane, especially near the surface and where the necrotic joins the living tissue. There has been evident exudative inflammation in the submucosa. The blood-vessels there are dilated, and there are many more leucocytes than normal in them. In the connective tissues and between the glands are many deeply staining nuclei of leucocytes, some of which are fragmented. The nuclear fragmentation is best seen in sections stained with an aqueous solution of fuchsin. There is an increase, too, in the submucosa of mononuclear cells, probably derived from proliferating fixed cells.

The process in the bronchi does not differ materially from that thus described. Besides the membrane on the surface, the smaller bronchi are plugged with an exudate of pus cells in which may be seen bacteria, some of which are bacilli, others apparently being cocci.

*Cervical Lymphatic Glands.*—The vessels are engorged and in places there have been actual hæmorrhages. There is evident hyperplasia of the lymphoid cells. Numerous foci of nuclear fragmentation are visible in the sections stained with aqueous fuchsin. Besides there are not a few actual necrosis, areas in which the nuclei of the cells do not stain, and the protoplasm has a strong affinity for cosin. No bacteria are seen in sections stained with Weigert's fibrin stain.

*Lung.*—In consolidated areas which correspond to alveoli surrounding small bronchi, the exudate consists of leucocytes, red blood-corpuscles, epitheloid cells and fibrin in varying proportions. In the central portion of the nodules the leucocytes with polymorphous nuclei predominate, the alveoli being full of them. In the alveoli in the periphery of the nodule, there are fewer leucocytes, more red blood-corpuscles, and the fibrin meshwork is abundant. The alveolar walls themselves are swollen and thickened, the blood-vessels in them are dilated, and the tissues are more or less infiltrated with leucocytes. The small bronchi are filled with polynuclear leucocytes, and in some places the lining cylindrical epithelium has been cast off to mix with the exudate. Not a few mononculear cells are seen in the bronchial pus. The interstitial character of the inflammation is well seen in the interlobular septa, which are swollen, œdematous, and infiltrated with cells. The

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pleura in some places shows a fresh inflammatory exudate, consisting of fibrin, red and white corpuscles, and a few mononculear cells. In the areas, which macroscopically were depressed and bluish in appearance, the alveolar walls are more or less collapsed, and the alveoli left are filled with inflammatory exudate. Here and there are small areas of vesicular emphysema. Scattered through the lungs are a few miliary and submiliary tubercles containing giant, epitheloid and lymphoid cells.

Sections of lung stained in Weigert's filbrin stain show in the broncho-pneumonic exudate a few micrococci, singly and in pairs.

The other organs of the body show the finer histological lesions produced by the poisons of the diphtheric bacilli. These have been so well described by Welch* and Flexner that we shall not speak of them in full. They consist chiefly of minute necroses, hæmorrhages, areas of nuclear fragmentation, and hyperplasia of the lymphatic apparatus.

*Bacterioscopic.*—Cover-slip preparation from the pseudo-membrane in the large and small bronchi showed very numerous bacilli which stained irregularly, were sometimes clubbed at one extremity, sometimes curved. They appeared morphologically to be identical with the *bacillus diphtheriæ.*

Cultures were made in slanting glycerine ager and blood serum tubes, and in making the inoculation from the organs, a considerable quantity of tissue was introduced into the medium by means of a small platinum scoop.

The pseudo-membrane of the larynx and trachea, the spleen, and the submaxillary gland gave almost pure cultures of the diphtheria bacillus. In the first 24 to 48 hours the tubes appeared pure of the diphtheria bacillus, but on the third day colonies of streptococci were numerous.

Cultures from the heart's blood and from the apex of the lung gave chiefly streptococci with a few colonies of the diphtheric bacilli.

Tubes inoculated from the base of the lung, the liver, and the cervical lymphatic gland gave pure cultures of streptococci. There was no growth in the kidney tube.

The above case represents in its clinical features the typical form of so-called true croup, and but for the posi-

*Welch and Flexner. "Histological Lesions Produced by the Tox-Albumen of Diphtheria." John Hopkins Hospital Bulletin. Vol. III., page 17.

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tive ætiological evidence might be cited as an instance of such a disease.

E. Fraenkel* reports four similar cases of primary laryngeal diphtheria in which the clinical examination and autopsy showed the parts of the throat above the epiglottis to be entirely free from inflammatory action. The diphtheric nature of the laryngial affection was substantiated by bacteriological proof and pathological examination.

Fraenkel concludes "that we are justified in confirmation of the results obtained by the investigations of a few of the earlier authors in regard to this question to declare idiopathic croup of the larynx as ætiologically identical with the croup of the air passages so frequently accompanying true pharyngeal diphtheria, *i.e.*, caused by the effect of the Klebs-Loeffler bacillus."

At the last meeting of this Society I reported among other cases of pseudo-diphtheritic angina, a case of measles having decided croupous breathing without visible deposit in the throat. At the autopsy, which was limited to the neck, the whole larynx was found to be lined by a tough, loosely adherent pseudo-membrane, in which the diphtheria bacillus was not found in the membrane by culture methods, cover-slip preparations, or stained sections, but streptococci were found in abundance by each of these methods. As sickness in this case had existed one week before examination was made by a physician, and at the autopsy the throat was not examined, we cannot be positive that the throat was entirely free from pseudo-membranous affection. It is, however, certain that a pseudo-membrane existed in the larynx, which, according to bacteriological proof, was not due to the effect of the diphtheria bacillus, but to streptococcus infection accompanying measles. It is probable that such a membrane may also form in the larynx alone from infection other than diphtheria, and give rise to the symptoms of so-called true croup.

*E. Fraenkel. "Zur Ætiologie des premaren Larynx Croup." Deutsche Medicinisch. Wochenschr., 1892, S. 564.

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The evidence then obtained by these more exact methods of study is altogether against the existence of idiopathic croup or pseudo-membranous affection of the larynx independent of some infectious disease, and supports the view that the supposed idiopathic croup is a true diphtheria of the larynx, or in rare cases may be the result of other infectious diseases, *e. g.*, measles and scarlatina.

Why the larynx should be infected and the throat which is first exposed to the bacilli escape, is not easy to explain. In some cases it may be that the bacilli are drawn with the current of air directly into the larynx and make no lodgement in the throat; in others the larynx may have been rendered more susceptible by previous disease, while the mucous membrane of the throat being healthy afforded sufficient resistance to the bacilli to prevent their development. It is reasonable to suppose that the latter explanation accounts for the affection being confined to the parts of the air passages below the epiglottis in the above described case.

In conclusion we would draw attention to another interesting feature in the case.

It has been formerly taught that the diphtheric bacillus does not pass from the original seat of infection to other organs of the body, and much stress has been laid upon this point as indicating the importance of local treatment.

The presence of diphtheric bacilli in the spleen and other organs in this child, and still more the recent investigations of Frosch,* cause us to modify somewhat our views on this subject. Frosch examined the organs of the body, according to bacteriological methods, in fifteen cases of diphtheria, and found the diphtheria bacillus in most of the organs in ten of them. In some instances the bacilli were evenly distributed in all the organs, in others preferably in the spleen and kidney. The distribution differed also in certain parts of the same organ.

The bacilli were rarest in the liver, most common in pneumonic areas, the spleen, the lymphatic glands, and

* Dr. P. Frosch. "Die Verbreitung der Diphtheric Bacilius im Körper der Menchen." Z'tschr f. Hygen. u. Infectionsk. 1893. Heft i. pp. 49-54.

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the heart's blood, being absent from the last in only one case. In nearly every case there was a mixed infection with several kinds of bacteria, chiefly streptococci and staphylococci.

Babes, Kolesko and Paltauf, and Sprouck have also found diphtheric bacilli in the organs of the body in single cases of diphtheria.

Howard* has reported a very interesting case of "Acute Ulcerative Endocarditis due to the Bacillus Diphtheriæ," in which cultures from the mitral valve, the lungs, liver, spleen and kidneys gave pure cultures of a bacillus identical in all morphological and cultural respects with the diphtheria bacillus. It failed, however, to kill animals when inoculated subcutaneously.

Recent experiments by Abbott† and Griskey indicate that in experimental forms of diphtheria the bacilli are carried into the body through the lymphatics. After injecting diphtheria bacilli subcutaneously into the tissues of the abdominal wall and in the testicle of guinea-pigs, they found the bacilli in the omentum in the leucocytes of the lymphatic channels, but never in leucocytes in the blood-vessels.

While, indeed, these findings are somewhat disappointing to those who had believed in an absolute restriction of the bacilli to the site of local infection, yet, they make no great practical difference in the management of the disease, for the bacilli do not appear in large numbers in the parts remote from the original seat of infection.

Frosch used large pieces of the organs in making his inoculation, and in my case a considerable quantity was used. Besides, the bacilli are with difficulty found in stained sections of the organs. It is doubtful if this invasion of the body generally by the bacilli is sufficient in any of the organs to be of such importance as to

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* Dr. W. T. Howard, Jr. "Acute Ulcerative Endocarditis Due to the Bacillus Diphtheriæ." Johns Hopkins Hospital Bulletin. Vol. iv., No. 30.

† Abbott and Griskey. "A Contribution to the Pathology of Experimental Diphtheria, with Special Reference to the Appearance of Secondary Foci in the Internal Organs." Johns Hopkins Hospital Bulletin. Vol. iv., No. 30.

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justify a modification of our views with regard to local treatment when this can be safely and effectively carried out. Its practical importance is also lessened by the fact that the great danger in diphtheria is from general disturbance resulting from the absorption of the tox-albumen produced by the bacilli.

DISCUSSION.

Dr. Seibert said he had made some experiments regarding the action of peroxide of hydrogen and other substances on diphtheritic membrane. He took portions of pseudo-membrane of diphtheria, about one-eighth of an inch square, and not quite so thick, which had been removed from the naso-pharynx of a child dying of diphtheria on the previous day. These contained a number of Loeffler bacilli. One piece was immersed in one ounce of fresh peroxide of hydrogen, another in the same quantity of a 1.250 solution of aqua chlori, and a third piece in Labaraquei's solution. After an immersion of ten minutes, attempts were made to make cultures. In twelve experiments, bacilli and streptococci grew in each case from the piece which had been in the peroxide of hydrogen. The cultures were negative with the aqua chlori, except those made from the centre of the mass after thoroughly crushing it, and after immersion in the aqua chlori for twenty minutes no more cultures were obtained. After immersion for ten minutes in the Labarraque's solution, and without shaking, the membrane had disappeared entirely. Dr. Booker's report showed that not only were the bacilli on the periphery of the pseudo-membrane, as heretofore stated, but that they must enter the system below the pseudo-membrane; hence they should be attacked there.

Dr. Fruitnight said that when he first used the peroxide of hydrogen in the strength indicated by Dr. Smith, he had noticed the uxudation spoken of, and believing this to be due to the acid impurities, he had used lime-water as a corrective, ordering the lime water in a separate bottle in proportion of one ounce to three ounces of Squibb's preparation of the peroxide of hydrogen. He preferred the lime water on account of its alkalinity as well as its solvent action on the membrane. With this remedy he had had excellent results. Trypsin was useful, but was too costly. As an instance of the efficacy of calomel sublimations, he said that in three cases in which he was prepared to operate, after using the sublimations

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for six or eight hours, there was no longer any necessity for the operation.

Dr. Caillé, referring to Dr. Booker's case, said that an anæmic or rachitic child with a bronchitis of such long duration should be taken from a locality in which diphtheria prevails, because the mucous membrane of the bronchi and trachea is in a favorable condition for the development of diphtheria. We can prevent diphtheria in the nasal cavities, but not in the lower respiratory tract except by the removal of the individual from the locality where the diphtheria is prevalent. He had been trying for the past ten years to convince his neighbor, Dr. Seibert, that nasal irrigations were very valuable, but he found he had failed. Their effect on the diphtheritic process is mechanical, not chemical. By washing away the putrescent material, one not only reduces the temperature, but exerts a positive beneficial influence on the local inflammatory action. If he had his choice, he would prefer naso-pharyngial irrigation to any other method of treatment.

Dr. Koplik said that "Buchner blood-serum"—a mixture of bouillon and blood-serum—is the most sensitive culture medium he had found in these cases where no membrane is visible. Sometimes, in such cases, we can find, at least, one colony of diphtheric bacilli, and so strengthen the diagnosis.

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# THE PRESERVATION OF COW'S MILK.

BY HENRY DWIGHT CHAPIN, M.D.,

Professor of Diseases of Children at the New York Post-Graduate Medical School and Hospital.

AS the subject of artificial infant feeding is resolving itself more and more into the administration of cow's milk in some form, the care and preservation of the milk assume great importance. It may be of interest to briefly glance at the different methods that have been used to keep milk sweet. Broadly speaking, there are two classes of agents that may be employed in milk preservation, the physical and chemical. Among the physical agents, cold is efficacious. Frozen milk keeps two or three weeks. In Siberia, milk is sold in lumps; likewise in France during the winter, when vessels with elastic walls are used (Molk. Z't'g, 3, 148, 207). The objection to this method is its expense. Heat is a much more popular and easily applied method. Simple boiling has been in use for many years with fairly good results. In recent years, however, sterilization has become the popular way of preserving milk. While having a good effect as far as preservation goes, the effect of prolonged heat upon the caseine and fat is not beneficial. According to Ellenberger and Hofmeister (Molk. Z't'g, 1892, 6) the milk

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remains more or less liquid in the stomach and can therefore get too soon into the intestine. As it does not clot like ordinary milk it may pass through the digestive tube too fast to be completely digested. The action of the stomach acids and of the lactic ferment on the caseine of sterilized milk is very incomplete. Stutzer (Molk. Z't'g, 1892, p. 24) finds that sterilized milk digests more slowly than raw milk. Wasileff (Molk. Z't'g, 1892, No. V.) analyzed excrement and found in it, after feeding sterilized milk, a larger proportion of nitrogen and fatty acids, than after feeding raw milk. Complete sterilization often requires either a very long time, or a temperature above 100° C. Twenty minutes at 100° C. to 115° C. effected it. Long heating not only diminishes digestibility, but the necessity for it indicates so much bacterial impurity that their excreta, which cannot be rendered harmless by heat, cause poisoning. (Soxhlet. Viertel jahresschrift für öffentliche Gesundheitspflege, 24, p. 8.) Kitasato has found that cholera germs sown in sterilized milk live three weeks; in ordinary milk, only until it gets acid. (Z'tschrift für angewandte Chemie, 1889, 114.) In order to get the best effect, milk should be sterilized as soon as possible after being passed. If delayed until an acid fermentation has begun, prolonged heat will produce a marked increase of toughening in the curds. An exceedingly tough substance for use in the arts is produced by throwing down the caseine in acid milk. A lesser degree of heat, as employed in pasteurizing, has lately been advised. Temperatures between 70° and 80° C. (158°-176° F.) are not always fatal to germs. Below 70° C., many saprophytes remain alive, even after very long heating. Above 80° C., death is fairly universal (Lazarus Z'tschrift f. H., 8, 207). Ritter states that thirty-five minutes at 68° C. killed the saprophytes, leaving only a few bacteria. The effect of pasteurizing on the digestility of milk does not appear to be so marked as sterilizing. The practical degree of such difference does not yet appear to have been determined by clinical observation. Pasteurized milk will not keep sweet very long.

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Electricity has recently been devised for the preservation of milk. G. Tolomei used static electricity, with balls 4 cm. apart, dipped in milk and charged by a Holtz machine, the charge lasting twenty minutes, and preserved milk nine days. Electricity renewed every seven days kept the milk one month. Similar results were obtained by passing a weak current through the milk, as well as by dipping into it a spiral covered with silk, with a current passing through it. (Le Stazione speriment agric. Ital. 18, 156, Feb., 1890.) Spiker and Gottstein say that caseine separates out sooner from electrized than from unelectrized milk, and that for this reason alone electricity is not suited for the sterilization of milk. (Bakt. Centralbl., 9, 77.) At my request Dr. Arnold Eiloart performed a few experiments with milk treated by electricity at the laboratory of the New York Post-Graduate Hospital.

*Induction Machine.*—Poles two inches apart, in a pint of milk. Machine worked twenty minutes. Milk so treated curdled much like untreated milk.

*Current through milk.*—A strength of thirty milliampères was passed through 30 c.c. of milk for fifteen minutes. The milk curdled in six days. The control portion curdled in five days and much coarser.

*Current through coil dipped in milk.*—

40 Grenet cells, 10 minutes had no effect.
4 " 23 hours 40 " " "

The last experiment repeated, however, kept the milk eight days longer than the control portion at a temperature of 32° C., so that the cotton plugging must have been imperfect the first time it was tried.

Chemical preservatives have been employed from time to time, with varying degrees of success. There is a prejudice against their use from the possibility of a deleterious effect, aside from their quality of preservation. Salicylic acid is effectual. According to Lazarus, it has no effect on typhus germs at the strength used for milk preservation. Boric acid or its compounds are preservatives, but their use has been interdicted by the German

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Marine. A strong dog was given 1 gm. boric acid per day for six days. He lost weight continually, salivated and had diarrhœa. A child given one litre of milk per day would consume 1 gm. of the acid if this were used as a preservative. (J. Mattern, Vers. d. fr. bayer. Chem.) A propriety substance known as Rex Magnus, and consisting of borax and salt, is sold for preserving milk. Three substances that seemed feasible to try, were experimented on by Dr. Eiloart, as shown in accompanying table.

| | Parts in 100 parts milk by weight. | Temperature. | Time of curdling in hours. | Controlcurdled in hours. |
|---|---|---|---|---|
| Sodium silico-fluoride..... ... | .01 | 32° C. | 16 | 16 |
| | .02 | 32° C. | 16 | 16 |
| | .1 | 35° C. | 70 | 22 |
| Ammonium fluoride..... | .1 | air | 144 | 144 |
| | .1 | temperature | 144 | 144 |
| Sodium fluoride..... | .1 | 35° C. | 22 | 22 |
| | .1 | 35° C. | 22 | 22 |

The only fluoride found effective at a strength of one per cent. is thus the double fluoride of silicon and sodium, but this decomposes so readily, the solution depositing silica on standing, that it seems quite as objectionable as borax, which is equally effective.

Some years ago Dr. Willis Cummings, of Bridgeport, Conn., conceived the idea that carbon dioxide would act as a preservative for milk and milk combinations. A number of experiments were undertaken in an ordinary bottling concern, with the same generators and fountains that are used in carbonating mineral waters. Milk was thus kept in seltzer siphons, exposed part of every day for fifteen days to the direct rays of the sun in August without decomposition. Milk from these siphons would not be sour after twelve hours' exposure in the ordinary temperature of a dining-room The doctor discontinued his experiments on account of the expense, as an elaborate plant was required, although satisfied that this method properly carried out affords a means of preserving milk indefinitely.

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The addition of peroxide of hydrogen appears to be a harmless and fairly effectual method of preserving milk. By its decomposition the extra atom of oxygen is given off, leaving water, that is certainly not injurious. The following table shows how acid fermentation was delayed in milk treated with various percentages of peroxide of hydrogen.* The best grade of ordinary commercial milk to be procured in New York was employed. During the experiments the milk was kept at a temperature not exceeding 72° F.

| SAMPLES OF MILK. | | REQUIRES TO BE MADE NEUTRAL. |
|---|---|---|
| No. 1, containing 0.5 per cent. $H_2O_2$, | after 6 hours, | 2.40 cc. of 1-5 normal sulphuric acid. sol. |
| | " 24 " | 0.80 cc. of 1-5 " " " |
| | " 48 " | 4.00 cc. of 1 5 " soda solution. |
| | " 54 " | 16.40 cc. of 1-5 " " " |
| No. 2, containing 1 per. cent. $H_2O_2$, | " 6 " | 2.80 cc. of 1-5 normal sulphuric acid sol. |
| | " 24 " | 2.00 cc. of 1-5 " " " |
| | " 48 " | 0.0 c . (neutral.) |
| | " 54 " | 9.20 cc. of 1-5 normal soda solution. |
| No. 3, containing 2 per cent. $H_2O_2$, | " 6 " | 3.30 cc. of 1-5 " sulph. acid sol. |
| | " 24 " | 3.20 c . of 1-5 " " " " |
| | " 48 " | 1.80 cc. of 1-5 " " " " |
| | " 54 " | 0.30 cc. of 1 5 " soda solution. |
| No. 4, containing no $H_2O_2$, (Control.) | " 6 " | 0.90 cc. of 1-5 normal sulph. acid sol. |
| | " 24 " | 0.00 cc. (neutral) |
| | " 48 " | 11.00 cc. of 1-5 normal soda solution. |
| | " 54 " | 21.60 cc. of 1-5 " " " |

At the expiration of twenty-four hours, the same milk of which samples were kept in duplicate, was treated as follows:

| | | REQUIRES TO BE MADE NEUTRAL. |
|---|---|---|
| To sample No. 1, containing at first 0.5 per cent. $H_2O_2$, was added an extra 0.5 per cent. $H_2O_2$ | after 48 hours, | 1.70 cc, of 1-5 normal soda solution. |
| | " 54 " | 3.40 cc. of 1-5 " " " |
| | " 72 " | 14.60 cc. of 1-5 " " " |
| To sample No. 2, containing at first 1 per cent. $H_2O_2$, was added an extra 1 per cent. $H_2O_2$. | " 48 " | 1.80 cc. of 1-5 normal sulph. acid sol. |
| | " 54 " | 1.00 cc. of 1-5 " " " " |
| | " 72 " | 2.00 cc. of 1-5 " soda solution. |
| To sample No. 3, containing at first 2 per cent. $H_2O_2$, was added an extra 2 per cent. $H_2O_2$. | " 48 " | 2.00 cc. of 1-5 normal sulph. acid sol. |
| | " 54 " | 0.60 cc. of 1-5 " " " " |
| | " 72 " | 0.00 cc. (neutral.) |

This experiment shows that milk can be kept much longer by adding another small quantity of $H_2O_2$ after a certain interval of time.

In order to be sure of the original milk, the next experiment was performed upon a dairy farm. Mr. Edward W. Martin, Chief Chemist of the New York Health Department, kindly undertook the following experiments with me, and their value is largely due to his careful oversight. The experiment was started at 8 A.M.,

*Marchand's Peroxide of Hydrogen (medicinal) was used in all of the experiments.

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with a sample of the previous evening's milk that had been at once cooled, and kept cool all night. After starting, the temperature was kept from 72° F. to 85° F. in order to apply an unusually severe test.

| | | |
|---|---|---|
| 1. Pure milk. | Sour at 4 P.M. | Bacteria, 4000 per cc. |
| 2. + 0.5 per cent. $H_2O_2$. | " " 8 P.M. | " " " |
| 3. + 1 per cent. $H_2O_2$. | " " 10 P.M. | " " " |
| 4. + 2 per cent. $H_2O_2$. | Soured during night. | " " " |

The beginning of souring was noted by the cochineal test, which is much more reliable than litmus paper; indeed the latter cannot be depended on in studying milk. A one per cent. cochineal solution is purple in an alkaline solution and reddish-yellow in acid medium.

Another experiment was made with commercial milk, at ordinary atmospheric temperature, bought on the morning of May 21st, as follows:

| | Pure Milk. | + 1 per cent. $H_2O_2$ | + 2 per cent. $H_2O_2$ | + 3 per cent. $H_2O_2$ |
|---|---|---|---|---|
| May 21st, 10 A.M. | + | + | + | + |
| 4 P.M. | = | +° | +° | + |
| May 22d, 10 A.M. | — | +° | +° | + |
| 4 P.M. | — | — | +° | + |
| May 23d, 10 A.M. | — | — | =° | +° |
| 4 P.M. | — | — | — | +° |
| May 24th, 10 A.M. | — | — | — | +° |
| 4 P.M. | — | — | — | =° |

The signs have the followiug significance: + Alkaline. = Beginning to turn. — Acid.
° Slight putrefactive change.

The addition of peroxide of hydrogen to milk does not seem to have much effect upon the growth of ordinary bacteria. The following experiment was made with ordinary commercial milk which usually contains large quantities of bacteria from the length of time it is kept. A one, two and three per cent. solution of $H_2O_2$ and milk was used, with a pure milk control. There were about the same number of colonies on all the plates, *i.e.*, 416,000 per cc. The only difference detected was that the pure milk had many liquefying colonies, while the peroxide solutions had none. The following bacteriological tests were made upon another specimen of commercial milk:

*Pure Milk.* 494,000 per cc. Many liquefying colonies.
*Pasteurized Milk.* 400 per cc. No liquefying colonies.
Sterilized Milk. No colonies.

The clinical disadvantages of giving milk that has been subjected to a high degree of temperature have been

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noted already. We lose chemically while we gain biologically. The sooner milk is given after leaving the udder, the better for the child. It is impossible in large cities, in the great majority of cases, to get it under 24 to 36 hours. It is then often necessary to employ various agents to prevent or arrest the rapid changes that ensue. We have in peroxide of hydrogen an apparently harmless agent that tends to retard the souring of milk.

Dr. Chapin presented a bottle containing impurities separated from a large quantity of milk by the centrifugal machine, at a carefully conducted dairy farm. The detritus was found by microscopic examination to contain pus and blood, corpuscles, dirt and hair. A new preparatoin of sterilized evaporated milk was also shown.

DISCUSSION.

DR. SEIBERT said regarding the evaporated condensed milk, that in 1890, Dr. Rehn, of Frankfort, called his attention to Soxhlet's sterilized condensed milk. This was prepared by first cleansing it with a centrifugal machine, and then condensing it to one-third its volume by evaporation, after which it was canned and sterilized for one hour. The speaker has found it an excellent article for use in traveling. If the preparation just shown proved equally successful, it would be cheaper and more available than the imported article. He had been much interested in the experiments with the peroxide of hydrogen, for they showed that a two per cent. solution of the peroxide of hydrogen either in milk or water, was not able to destroy the bacteria in that fluid. This agreed in part with the remarks he had made already about its action on diphtheritic membrane, and it served to emphasize still more strongly the lesson taught by his experiments, namely, that the treatment of diphtheria by peroxide of hydrogen should be discontinued.

Dr. CHAPIN said that one reason it did not act more powerfully in milk was that the casein and the fat decompose the peroxide of hydrogen.

DR. ROTCH thought that it was unwise to introduce any foreign element whatever into the milk which is given to infants if it could possibly be avoided. Our

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aim should be rather to make an advance in the direction of securing pure milk. This can be accomplished to a very great extent by improved methods of caring for and feeding the cows, so as to produce a milk having a composition especially suited to infants. For instance, there should not be enough dirt in the primal milk to give such a residue as that shown by Dr. Chapin. Where cows are properly handled, and where, in spite of the expense, fine, clean sand is used for their bedding instead of straw and leaves, there will not be this quantity of dirt in the milk. He had seen four or five hundred quarts of milk taken directly from the farm and filtered through a pure white cloth, with the result that only three or four specks of dirt were left on the cloth. Some of this milk had been examined bacteriologically, and he had been accused of sterilizing the milk before sending it, so different was it from the other milk brought for examination. He did not wish to decry the efforts made by Dr. Chapin, for under some circumstances it might be necessary to adopt some such method as he suggests for preserving the milk, but these circumstances must be considered very rarely present.

The centrifugal machine is especially adapted for preparing modified milk for infants, and this method of preparation is far preferable to introducing anything into the milk to preserve it. Any one who once uses milk cleansed in the separator, will not wish to drink milk which has not been so treated.

He hoped the Society would not endorse evaporated condensed milk. For many years he had had charge of a children's hospital, and had found in a general way that condensed milk was better than the other foods, but after comparing the results obtained from feeding with condensed milk of various kinds, and those obtained with the method of writing a prescription for modified milk for each case, he could say without reserve that the latter method was far better. Although evaporated milk is much more sterile than the other foods, it is not sterile for any great length of time after opening the box. He hoped the Society would in the future put itself on record against using these proprietary foods.

DR. KOPLIK also thought it a mistake to add anything to milk to preserve it. Lister preserved milk indefinitely by cleaning the udder of the cow; our object, therefore, should be to get milk as pure as possible, and to sterilizit at as low a temperature as possible. If we could see

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cure perfectly pure milk, *one* Pasteurization would keep the milk very nicely. Personally, he sterilized the milk at a rather high temperature, but this was because the milk that he could get in the city was in such a condition as to make this necessary. Dr. Rotch was a pioneer in the reconstruction of milk, and was fortunate in being now able to get the milk in Boston within two or three hours after milking. As to the centrifugal machine, it drives the bacteria into the cream, so that skimmed milk is much more free from such organisms than ordinary milk. Soxhlet had shown that if a sterilized fifteen per cent. solution of milk sugar be mixed with an equal quantity of milk, the resulting mixture is equal to mother's milk, and will in a measure take the place of Dr. Rotch's reconstructed milk.

DR. ROTCH said that Soxhlet might have made that statement, but he was a chemist and not a clinical investigator. The speaker felt sure that woman's milk could not be imitated in this way. A modified milk laboratory would be established very soon in New York City, he said, and probably others would be started elsewhere before long.

DR. CAILLÉ said he had been much interested in Dr. Chapin's experiments, for, as he had introduced into the milk a substance which was entirely harmless, his experiments were to this extent very conservative. When mixed with milk, peroxide of hydrogen is immediately split up into oxygen and water; hence, it is a harmless addition, and he thought this had been fully proven by the results. If anything harmless could be added to milk which would be capable of preserving it for twenty-four hours, it would be very desirable, but he felt sure that no such substance would be found. He fully agreed as to the uselessness of proprietary foods and of condensed milk, except occasionally on long voyages. He would suggest that the evaporated cream be put up in one-ounce cans; then it would be of service.

DR. CHAPIN, in closing, said he was quite in sympathy with the general trend of the discussion as to the importance of securing an ideal condition at the dairy, but until these conditions had been attained in actual practice, other methods were of value. Sterilization, or anything else, is worthy of consideration which will retard the fermentation of milk. The objections raised by Dr. Rotch would apply equally to Pasteurization and Sterilization by heat.

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# DESCRIPTION OF A NEW INCUBATOR.

BY T. M. ROTCH, M.D.

Boston, Mass.

DR. ROTCH said that children born before the seventh month are almost always lost when treated by the usual methods, and even with the aid of such incubators as have been heretofore devised. This, he thought, was a needless sacrifice or infant life. His object in calling attention to the subject at present was to describe a new form of incubator, which had none of the disadvantages of older ones, while possessing many new and useful features. Some of the more important requirements of such an apparatus are:

(1) It must be so constructed as to admit of thorough cleansing and disinfection. (2) It must be portable so that it may be brought quickly, preferably from a central station, to any house where it may be needed. (3) Provision must be made for thorough and automatic ventilation. (4) The external air must be modified before it is admitted to the incubator. (5) It must be so arranged that the temperature of the incubator can be easily and accurately adjusted to any point desired by the individual physician. (6) The air should be clean, for it takes very little to destroy the life of these prem-

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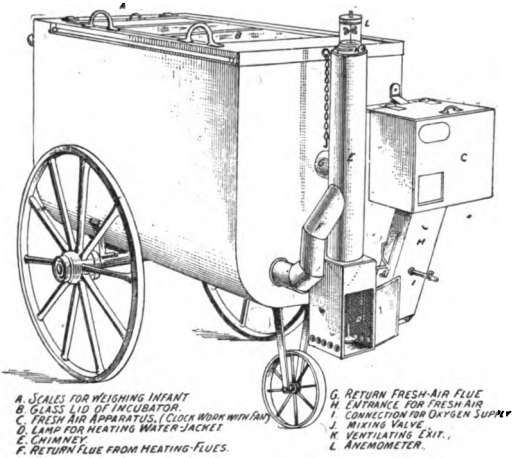
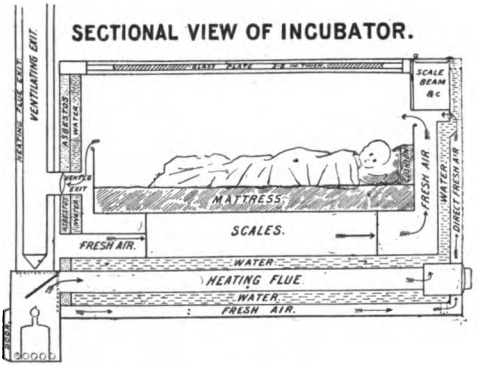
ature infants. (7) As in these children, there is often considerable pulmonary atalectasis, it is desirable that provisions be made for increasing, when desired, the proportion of oxygen in the air admitted to the incubator. (8) As one of the best danger signals is loss of weight of the infant, the construction of the apparatus

INCUBATOR FOR PREMATURE INFANTS.


A. SCALES FOR WEIGHING INFANT
B. GLASS LID OF INCUBATOR.
C. FRESH AIR APPARATUS. (CLOCK WORK WITH FAN)
D. LAMP FOR HEATING WATER-JACKET.
E. CHIMNEY.
F. RETURN FLUE FROM HEATING-FLUES.
G. RETURN FRESH-AIR FLUE
H. ENTRANCE FOR FRESH AIR
I. CONNECTION FOR OXYGEN SUPPLY
J. MIXING VALVE.
K. VENTILATING EXIT.
L. ANEMOMETER.




should be such as to admit of determining at any time the weight of the baby without exhausting it, as is invariably the case by the usual method of weighing. To Mr. John P. Putnam, of Boston, is due the credit of planning this incubator and Mr. Gordon, of the milk laboratory in Boston, has assisted me greatly in devising the mechan-

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ical means for carrying out my ideas. The incubator is constructed of polished copper, and is placed on wheels so that it may be moved about easily. This is a small but not an unimportant detail, for the mother naturally insists upon frequently looking at the child to see how it is doing, and by this arrangement her wish may be gratified without disturbing or injuring it. The entire apparatus being constructed of metal, it can be easily and effectively cleansed and sterilized, thus avoiding any danger of carrying infection from house to house. Former incubators have been particularly defective in the arrangement of the ventilation, so that the constant watchfulness of a nurse, day and night, was necessary to insure the occupant of the incubator against death by suffocation. In the new machine, the ventilation is kept up by an apparatus run either by clock-work, or by heat in the ventilating flue. At the top of this flue there is a little fan or anemometer which shows to the attendant at a glance whether or not the ventilating apparatus is working properly. Before the external air is allowed to enter the incubator, it is thoroughly filtered through cotton so as to free it from impurities. The baby is heated by radiation from all sides, and the bed on which it lies is a beautifully constructed balance, so that at will the weight of the baby can be ascertained at any moment. A tube connected with the incubator admits of adding oxygen to the air. A sort of rubber curtain is attached to the incubator, so that when the attendant is feeding the baby, or making necessary changes in the interior of the apparatus, the communication between the incubator and the external air is reduced to a minimum. The excreta are passed into cotton, which is changed once a day. It is also very important to exactly modify the milk so that it may be adapted to the very feeble digestive powers of the premature infant. The incubator already constructed presents a very handsome appearance, and forms part of the Harvard exhibit at the World's Fair. It weighs about one hundred and fifty pounds.

Dr. Caillé said that they hoped to have one of these incubators soon in the Post-Graduate Hospital. He thought if they had had it one child could have been saved recently.

Dr. Holt said he could testify to the very unsatisfactory working of the ordinary incubators heated by hot water bottles.

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# PLAUSIBILITY OF THE DIRECT TRANSMISSION OF TUBERCULOSIS TO THE FŒTUS FROM EITHER PARENT.

BY JOHN M. KEATING, M.D.,

Colorado Springs.

THERE is no subject more attractive to us in this section of country than that connected with the various forms of tuberculosis, because we see this disease in all its stages and all its forms. We also see it at a most interesting period of its existence, *i. e.*, when it is checked in its career by nutritive influences, or when it is so localized and subject to such limitations as to become, so to speak, harmless and inert.

Can women have tuberculosis without evidence of its being primarily in the lungs ?

A paper has recently appeared which is very important. It is a study of tuberculosis of the female generative organs, by Dr. J. Whitridge Williams, read before the American Gynæcological Society, and appearing in their transactions for 1892. This paper is based upon careful study, made in the Pathological Department of Johns Hopkins Hospital. According to this writer, there are

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three modes by which tubercle bacilli may gain access to the genital tract. *First*, from areas of tuberculosis already existing in the patient; *second*, from the outer world by direct infection; *third*, by bacilli which originated in the patient gaining access to the outer world and then invading the genital tract, *i. e.*, an auto-infection by the excretions of tubercular patients. Of course, it will naturally be inferred that usually a diagnosis of tubercular diseases situated in the generative organs of the female is not always to be arrived at during life, but to be found only from post-mortem examination. The methods of infection, *first*, are from the blood. Proof of this is found in cases of tuberculosis in puerperal women, in which the genitals are affected, and where the disease is found most marked at the placental site; also, where there is no involvement of the peritonæum, intestines, or lesser organs. The fact also of this appearing at the fibriated extremity of the Fallopian tubes is explained by the extreme vascularity of that portion, and also this may be true of the ovary. Williams goes on to state that even where no tuberculosis is to be found anywhere else in the body, other than the generative tract, the question of blood infection must not be dismissed, because we find it largely existing in apparently primary cases of bone lesion and local tuberculosis elsewhere. *Secondly*, infection from the peritonæum. A very large number of cases of genital tuberculosis owe their origin to infection from the peritonæum. Our author quotes a number of authorities for this, giving as high as fifty per cent. of the cases of tubercular peritonitis with the tubes affected. *Third*, infection from other organs. Of course we have quite a large number of cases in which tubercle bacilli find their way from neighboring foci to the genital tract. They may come from the small intestine, from the rectum, from the peri-rectal abscesses, from tubercular ulceration of the bladder and from rectal fistula, etc. This form of infection is rarer in women than in men, and in proportion about one to three, owing to anatomical differences. *Fourth*, infection from without.

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There is no question about it but that the bacilli frequently gain entrance in this way; but the point is, whether they give rise to genital tuberculosis. Dr. Williams tells us, in his summary, that though he is not satisfied that it cannot occur,—on the contrary, it does occur in some instances,—as yet there has been no scientific proof of this, and indeed a scientific proof is manifestly difficult to bring about. He quotes this also as Pozzi's opinion.

Bacilli can be introduced by the examining finger, by the use of dirty instruments or syringing, by unclean linen, or sleeping in the same bed with a tuberculous patient, and in many ways, as Williams says; but the most important is whether it can be introduced by coition, and we will summarize some of the valuable studies made by this author in discussing this portion of the question. Cohnheim was probably the first to discuss this question, but he has stated that if it did occur it was rare. As is known, genito-urinary tuberculosis is common in men, occurring as tuberculosis of the bladder, epididymus, testicle, peri-urethral abscess or tuberculous ulceration of the penis. Jani has shown that tubercle bacilli may be found in the testes and prostate glands without these organs exhibiting any evidence of tuberculosis. This he found five times in the testicle, four times in the prostate glands, but none in the semen. Birch-Hirschfeld has lately reported as having found bacilli in the seminal tubules, and that, therefore, undoubtedly bacilli or their spores gain entrance into the female genital tract without any evidence of local disease on the part of the individual inoculating them. As we shall see further on, primary tuberculosis of the vagina and cervix is rare, and, therefore, it is usually after these bacilli gain entrance into the uterus or the tubes that infection results, and even then, should they gain entrance into these passages, the probability is that it would be necessary for them to reach the tubes before they would be able to multiply unmolested, and this would probably account for the fact that the tubes are more frequently

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infected than the uterus, in primary cases. The experiments of Oncarani in 1890 demonstrated the fact that tubercle bacilli introduced into the vagina of rabbits, even after the surface had been rubbed with tincture of iodine, did not produce genital tuberculosis, but that the animals usually died of general tuberculosis, thus contradicting the statements of Cornil and Doborlonsky. Williams also reports studies made in this line with pure culture of tubercular bacilli injected into the vagina of rabbits and substantiates the statements of Oncarani as far as the inability to produce tuberculosis of the genital tract, though, in his cases, no tubercle bacilli were found anywhere in the body afterward. He thus states in his summary that it has never been satisfactorily proven that genital tuberculosis occurs as the result of infection by coition.

The conclusions that our author arrives at in the end of his paper are: *First*, genital tuberculosis may occur at any age, from ten weeks to eighty-three years, but usually between the twentieth and fortieth years; *second*, it is usually secondary to tuberculosis elsewhere, but in a considerable number of cases is primary in the vagina; *third*, its frequency is much greater than is usually supposed. In his experience, about eight per cent. of all appendages removed for inflammatory disease are tuberculosis. *Fourth*, every portion of the genital tract may be infected, the order of frequency being: tubes, ovaries, vagina, cervix and vulva. The tubes are infected in nearly all the cases; the uterus from sixty to seventy-five per cent.; the ovaries from forty to forty-five per cent. *Fifth*, tuberculosis of the crevix no doubt occurs more frequently than is usually supposed and may be taken for carcinoma. *Sixth*, tuberculosis of the tubes and ovaries is usually limited to the mucous membrane and occurs in three forms—miliary tuberculosis, chronic diffuse tuberculosis and chronic fibroid tuberculosis. The second of these divisions is the most frequent. *Seventh*, genital tuberculosis may be due to direct infection from without. The occurrence of infection is very probable,

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but has not been conclusively proven. In the majority of cases it is secondary to tuberculosis elsewhere. Even in the apparently primary cases, it is impossible to exclude blood infection. We will not quote those portions which refer to prognosis, diagnosis and treatment, but merely state that the above deductions are based upon the detection of bacilli.

Winckel, in his article on Diseases of the Urethra and Bladder (Encyclopædia of Obstetrics and Gynæcology), mentions that tuberculosis of the urinary bladder is extremely rare in women. He quotes four cases among 2,505 necropsies, and all four were cases in which tuberculosis existed elsewhere. Breisky, in his article on Diseases of the Vagina (Encyclopædia of Obstetrics and Gynæcology), in writing of tuberculosis of the vagina, says that it is usually secondary to tuberculosis elsewhere. He reports but one case, quoting Henry Thompson, where cheesy masses were found in the vagina, which was found to be the starting point of the genital tubercular process. In reading over this case, it looks to us rather doubtful. In this connection, we may quote the following, which is of interest, from the article on "Vesical Tuberculosis in the Female," by Stewart Paton (*New York Journal of Gynæcology and Obstetrics*, March, 1893): "Strümpell says that it is four times more frequently met with in the female than in the male bladder; while Winckel, on the other hand, says the reverse is the case. This (Strümpell's) view is tenable if we adopt the statements of Verneuil and Venhére, and, in fact, the majority of observers who look upon the urethra as the way through which the tubercle bacillus enters the bladder and only in rare instances through the glomeruli of the kidney."

Another monograph that has attracted our attention is one on Salpingitis, by Dr. Theodore Landau, which is an exhaustive study on this subject. Though he acknowledges that primary tuberculosis of the genital tract may take place from without, and attributes it to any cause which will carry bacillus within, including intercourse

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with a phthisical subject, he does not cite any cases or make any definite statements which will prove this admission. He states that the bacillus entering the vagina does not remain in the uterus, because it there meets unfavorable conditions for its lodgment, but is lodged directly in the tubes. He considers this a remarkable fact, which has yet received no explanation.

The presence, therefore, of tubercular disease on the abdominal end of the Fallopian tube does not depend entirely upon an auto-infection ; but, according to these authors, its existence there is compatible with the fact of its having been carried to that point from without. The remarkable discovery which was noted by H. P. Loomis a year ago, in which bacilli were found in the bronchial glands of persons meeting accidental death while in perfect health, shows that undoubtedly a large percentage of individuals have these microörganisms migrating in their tissues without their being conscious of any local tubercular manifestation, and, therefore, the presence of bacilli in the genital tract of women who have no evidence of pulmonary disease is no proof that they have been introduced per the vagina, although they may be married to tubercular husbands. The finding of

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THE PRESENCE OF TUBERCLE BACILLI IN THE LYMPHATIC GLANDS OF NON-TUBERCULAR SUBJECTS.—Primary tuberculosis of the lymphatic glands, although a rare condition, has been fairly well investigated and its pathology is now tolerably well known. It is not in this direction, therefore, that Dr. Pizzini (*Zeitsch. f. klin. Med.*, xxi, 3-4, 1892) has directed his researches. He has endeavored to ascertain, by systematic investigation, whether the lymphatic glands of non-tubercular individuals, who die of some other disease than tuberculosis, contain any tubercle bacilli, and his experiments have disclosed some very interesting facts. He ionculated guinea-pigs with the bronchial, mesenteric and cervical glands of thirty adults free from tuberculosis and in whom death was due to acute disease or accident. Twelve out of the thirty guinea-pigs inoculated rapidly developed tuberculosis, from which it may be inferred that Koch's tubercle bacilli may be present in the body of perfectly healthy individvals without giving rise to any perceptible lesions. But tubercle bacilli were not found indiscriminately in the various groups of glands experimented with. One would *a priori* expect to find them more frequently in the bronchial glands. The correctness of this assumption is clearly demonstrated by Dr. Pizzini's experiments, which also disclose the important fact that in not one out of the thirty guinea-pigs was tuberculosis produced by inoculation with the mesenteric glands. This leads us to the equally-to-be anticipated conclusion that the disease is much more frequently acquired through the lungs than through the alimentary canal. Introduced into the trachea and large

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bacilli in the secretions from the male generative tract is ample evidence that they can at opportune times find their way into the Fallopian tubes, but the large number of wives who never exhibit a symptom of tuberculosis undoubtedly shows that the presence of bacilli in the Fallopian tube is no indication whatever that the woman must necessarily become tubercular.

Now let us discuss for a moment another phase of our subject. We may state most emphatically that tubercular women have given birth to tubercular children. We do not mean, by tubercular children, children that are predisposed to tuberculosis, but that bacilli have been found in almost every organ of the fœtus, in an active condition capable of culture; that they have been found on the fœtal side of the placenta, and that the only way they have gotten there has been through the maternal circulation. Such a case has been reported by Birsch-Hirschfeld, and is as follows:

"*Tuberculosis of the Placenta.*—Lehmann (*Deut. med. Woch.*, March 2, 1893) says that, in regard to hereditary tubercle, it has not yet been definitely proved whether the disease is conveyed from the parents to their children by means of the inhalation of infected air, or whether it

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bronchi, the bacilli are deposited on the surface of the mucous membrane through which they pass, whether it is healthy or the seat of catarrhal inflammation, and thus find their way to the bronchial glands which are connected with the respiratory mucous membrane by means of very numerous lymphatics. There they remain dormant, but still retain their vitality (as is readily shown by inoculation), until for some cause or other they are roused again to activity. The fact that virulent tubercle bacilli are found in the glands in such a large proportion, 40 per cent. of healthy individuals, without giving rise to any manifestation, enables us to understand the anomalies which are sometimes present in certain clinical varities of pulmonary phthisis. In presence of these results the question might also be asked whether there is any hope of success in the attempt to effectually protect ourselves by prophylactic measures against such a widely distributed organism. Ought we not to consider the part played by certain conditions of *milieu* and by secondary causes of greater importance than the actual introduction of the bacilli into the system? The occurrence of certain acute forms of tuberculosis, of miliary tuberculosis in particular, is perhaps to be explained by the presence of living tubercle bacilli in apparently healthy glands, ready to spring into activity again and to infect the whole organism on the first favorable opportunity. This is usually afforded them by the occurrences of such diseases as diabetes, measles, etc., which favor their growth and development."—(*Medical Week*, Paris, February, 1893).

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is directly transmitted from the mother to the fœtus in utero. The frequency of joint and glandular tuberculosis in children speaks in favor of the latter view. In animals a few cases of intra-uterine infection have been proved. The author refers to the case reported by Schmorl and Birsch-Hirschfeld (Supplement, June 6, 1891, p. 177), who showed that tubercle bacilli could pass over from mother to fœtus, but it could not be proved how this transmission really occurred. Lehmann now reports a case of tuberculosis of the placenta occurring in a woman, aged twenty-nine, who died of acute tuberculosis in the eighth or ninth month of pregnancy. The fœtus and placenta were removed a few minutes after death, but the fœtus was dead. With the exception of one or two foci of disease, non-tuberculous in nature, in the lungs and liver, nothing abnormal was found in the fœtus. On both surfaces of the placenta, however, three or four grey transparent nodules were found. Sections from the hardened and embedded tissue revealed the characteristic structure of tubercle, and bacilli were demonstrated in it. Thus in a case of acute tuberculosis, with no lesion in the intestine or peritonæum, there was a tuberculous affection of the placenta in all its parts, and thus, in such a case, a plausible explanation of the transmission of tubercle from the mother to the fœtus is supplied. Numerous bacilli find their way into the placenta, and set up the characteristic lesion. Thus the infection may readily pass from the mother to the fœtus either through the direct extension of the tuberculous process from the maternal to the fœtal structure, or through the rupture of breaking down foci from the decidua into the chorionic villi."—(*British Medical Journal*, March 18, 1893).

In referring to Jacobi's article on Hereditary Tuberculosis in Children (Cyclopædia Diseases of Children, Vol. 2, p. 167), we find that he acknowledges the probability of transmission. Indeed, he recites a case in his own practice of a consumptive woman who gave birth to a seven months' old fœtus that had grey miliary

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tubercles in the region of the liver, spleen and on the pulmonary pleura. He recites the fact of variola, syphilis, relapsing fever, and malaria being transmitted direct from the mother to the fœtus. He quotes Baumgarten as reporting cases of tuberculosis so well defined at the age of one month as to make its start in fœtal life probable, and also a case reported by Demme of a baby three weeks old with tuberculosis of the intestines, with bacilli; and also another one, four weeks old, with pulmonary cavities.

We may also refer to the article by Ballantyne on Congenital Measles (ARCHIVES OF PEDIATRICS, April, 1893). When we come to consider the question of other infectious diseases, if we wish to reason by analogy,—and there is no reason why we should not,—we can find much to quote. Simon (*Arch. f. Kruder* xiii., 1 and 2; ARCHIVES OF PEDIATRICS, Nov. 1891, p. 851) writes most interestingly in confirmation of Birsch-Hirschfeld's conclusions that pathogenic micro-organisms pass directly from mother to fœtus. We may conclude that this matter is definitely settled. The records of numerous observers agree in the statement that mothers may give birth to syphilitic children without their manifesting the least evidence of syphilis themselves. No higher authority is necessary than Johnathan Hutchinson, and we here quote a letter which appears in a contemporary review, in a paper by Herbert Spencer: "I do not think that there can be any reasonable doubt that a very large majority of those who suffer from inherited syphilis take the taint from the male parent. . . . . It is the rule when a man marries who has no remaining local lesion, but in whom the taint is not eradicted, for his wife to remain apparently well, whilst her children may suffer. No doubt the child infects its mother's blood, but this does not usually evoke any obvious symptoms of syphilis. . . . I am sure I have seen hundreds of syphilitic infants whose mothers had not, so far as I could ascertain, ever displayed a single symptom." We have, of course, in this connection, to

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consider Colle's law of apparent immunity without any outward manifestation, and also the process known as *choc en retour;* but, as the most learned syphilographers seem to disagree, we may, with good cause, adopt the cases cited by Hutchinson, Taylor, Hyde, Fournier and others as establishing the fact that a mother *can* give birth to a syphilitic child without her exhibiting the least evidence of the disease herself. We do know of local genital tuberculosis in women which has not produced pulmonary phthisis, and indeed probably many women are infected locally and the bacillus never gets beyond the seat of infection,—so well exemplified in surgical tuberculosis. In this way a mother with apparent immunity might transmit to her offspring. I have seen cases of children dying of tubercular meningitis before the first year, where the mothers exhibited no evidence whatever of tuberculosis, but where the father was a pronounced consumptive before marriage. May we not then believe that a tubercular father can propagate a tubercular offspring, just as we know a syphilitic one is liable to do, without infecting the mother? We have also another fact which helps to maintain the analogy, viz., the latent manifestations of these two diseases under these conditions. I once attended a family whose history is as follows: The father, a student in Vienna, developed a syphilitic *palmar psoriasis*. He consulted Hebra, was put on vigorous treatment and pronounced cured, with permission to marry. His wife I frequently attended, examined her repeatedly, and she never exhibited any symptom whatever of syphilis of any kind. The first child, a boy, grew up to be a strong, healthy lad, and when I saw him at the age of about ten years had chronic nasal catarrh. An eminent specialist in Philadelphia, not knowing the history of the case, confidentially wrote me that he believed the trouble to be of syphilitic origin. Here undoubtedly the taint became latent and was manifested in this form. Subsequent children—three in all—showed more or less evidences of this inheritance.

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I reported last year to the American Pediatric Society a case of hip-joint disease, which was pronounced tubercular by Dr. Gibney, of New York, which had the following family record: The father was tubercular; had three children all markedly strumous, but the mother was always strong and healthy and never exhibited any evidence whatever of tuberculosis. We have all seen such cases, and, though many are apt to lay stress on the fact that the bacilli may come from outside, through sputum and find a fertile soil, when they gain entrance, we cannot but also believe that they may have been implanted at a much earlier date, remaining latent and becoming active when the soil is rendered suitable by conditions of enviroment, either local or constitutional.

Can we conclude as follows?

(1) Unrecognized genital tulerculosis in women without pulmonary disease is not uncommon.

(2) A tuberculous mother can transmit the disease to her offspring in utero.

(3) Tuberculosis is apparently at times confined to the generative organs of women, probably with greater frequency than we now recognize.

(4) Bacilli or their spores can be conveyed by means of seminal secretion to women when no apparent tubercular lesion is present in the male generative organs.

(5) Women may, and often do, escape tuberculosis when transmitted in this way, and even when evidence exists of tuberculosis of the male generative organs.

(6) Is it not possible for the father to transmit his disease directly to the fœtus, the mother not proving a fertile soil, and, if so, is it not possible for this inheritance to become latent in the child only to manifest itself when accident or environment tends to bring it into activity? And can we not go still further and assert that the bacillus or its spores, inherited from either parent, may be carried into another generation and either become manifest in glandular affections, joint troubles or even finally in pulmonary disease?

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Authorities agree that fully 50 per cent. of phthisis cases show the taint in their family record and though the contagionists would wish us to believe that the *susceptibility* only is inherited, we feel convinced that the majority of practitioners will agree that tuberculosis, like syphilis, often gets more than susceptibility from its progenitors.*

DISCUSSION.

DR. JACOBI said if the author had carried his literary researches a little further, he would have found even more proofs than those mentioned. In the Transactions of the Paris Congress of Tuberculosis, a few more cases of direct transmission of tuberculosis are to be found, so that there are altogether seven or eight undoubted cases of such direct transmission.

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## PROCTITIS IN EARLY INFANCY.

BY LOUIS STARR, M.D.,

Philadelphia, Pa.

A SEVERE grade of acute catarrhal inflammation confined to the mucous membrane of the rectum and lower bowel is of rather infrequent occurrence during the earlier months of life, but it is a condition well worth attention and study because it gives rise to symptoms which, without careful analysis and local inspection, are misleading and prone to suggest misdirected and unavailing treatment. Thus, infants suffering from proctitis are fretful, ill-nourished, more or less feverish, sleep badly, and have bowel movements which are green in color, contain mucus, and vary in number from six to fifteen or twenty in each twenty-four hours. Such a group of symptoms at once suggests ordinary catarrhal diarrhœa

*Since this paper was written I have had my attention called to a most exhaustive and interesting study of this subject by Dr. A. Gartner, of Jena, which appeared in *Zeitschrift f. Hygiene und Infeck.*, Koch & Flügge, No. 2, Vol. 13, 1893, which is well worthy of careful study.

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due to improper feeding, and the greater number of cases that have come under my observation have been brought to me because they obstinately resisted both the dietetic and therapeutic treatment usually successful in this disorder.

The following case may be cited in illustration

Catharine ——— was six weeks old at the date of my first visit. Her birth had been accomplished at full term and without difficulty; she weighed eight pounds; was well developed and during the first week of her life made good progress, as her mother was able to furnish an abundant supply of nourishment. In the second week, however, she became fretful; cried often, as if in pain; was restless and wakeful; had increasingly frequent evacuations from the bowels; grew pale, and ceased to gain flesh and strength.

The treatment at that time adopted consisted of a daily dose (one teaspoonful) of pure olive oil to cleanse the bowels of irritating matter, small doses of aromatic syrup of rhubarb and alternating courses of chalk and bismuth. The mother's diet also had been regulated, but in spite of all, the diarrhœa continued and the infant's general condition grew slowly but steadily worse.

When I first saw the little patient she was restless; her skin was pale, the tissues generally rather flabby, the anterior fontanelle was somewhat depressed and there was slight pyrexia. The tongue was fairly clean; she nursed with a moderately good appetite and there was little regurgitation and absolutely no vomiting.

The bowel movements numbered about fifteen in the twenty-four hours. Three or four of these, which, by the way, occurred at moderately regular intervals, were large, yellow in color, and contained only a few small curds and a trace of greenish mucus. The remaining and more numerous passages were small, scarcely more than one or two teaspoonfuls in bulk, were composed almost entirely of greenish or dark yellow mucus, were voided with a "spurt," and their evacuation was attended by considerable straining and crying, symptoms which were almost entirely absent at the time the freer actions occurred. The skin for several inches around the anus was reddened and excoriated and the mucous membrane of the rectum, so far as could be seen by eversion of the gut, was intensely red and irritated.

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The urine was voided freely; the heart and lungs were sound, and the abdomen was normal in size and soft and painless on palpation.

Upon examination, the mother's milk was found to vary from the standard of perfection in that the reaction was neutral and the percentage of cream was diminished, but its quality was far from bad.

Directions were given to wash out the infant's lower bowel every morning and evening with a solution of half a drachm of sodium chloride to eight fluidounces of water at a temperature of 98° F., following each washing with an enema of one fluidrachm of pure olive oil and two fluidrachms of lime water. The abdomen was ordered to be gently rubbed for five minutes twice daily with warm olive oil, and a powder, consisting of ext. pancreatis (Fairchild's), ½ gr., sodii bicarbonas, 1, gr., and pulv. aromaticus ½ gr., was prescribed after each nursing.

The mother was cautioned to nurse the child only at regular intervals of two hours; her own diet was carefully regulated, and she was placed upon an alkali and moderate doses of cod-liver oil.

Under this treatment, improvement was rapid. The intertrigo soon disappeared; the redness of the rectal mucous membrane diminished; the number of small, painful evacuations lessened and there was much less crying and better sleep.

At the end of ten days, the deep injections and enemata were reduced to one each day; after another week, they were discontinued entirely, and a few days later, al treatment was suspended, the child being perfectly recovered.

From this case, which is fairly typical, it may be inferred that one may be led to suspect inflammation of the rectum when, while the patient has a clean tongue, a moderately good appetite, very slight febrile reaction and but moderate symptoms of general health failure in the way of wasting, pallor and prostration, there is a history of increasingly frequent, small-bowel movements that are expelled by a straining effort, which the facial expression and fretful cries show to be painful. When these symptoms lead to an examination, the skin for some distance around the anus will be found to be reddened and excoriated, and if the lower portion of the rectum be everted—

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a feat easily accomplished by lateral pressure of the thumbs placed on either side of the anus—the exposed mucous membrane will show intense redness and often superficial linear ulcerative patches.

Another distinctive feature is the character of the evacuations, the greater number of which are small in quantity and composed of greenish or brown mucus. Several times daily, as in the case cited, there may be a large bowel movement, which is nearly normal in appearance.

Proctitis is most apt to exist as an isolated affection in early infancy, but this is not always the case. In two of my patients there has coexisted a very similar catarrhal inflammation of the mucous membrane of the mouth with a peculiar T-shaped ulceration, the horizontal branch of the ulcers being situated over the position of junction of the hard and soft palates, the vertical branch extending downward from this toward the uvula. In older children proctitis is usually associated with more or less acute catarrh of the whole intestinal canal, and is a secondary condition, being induced by the irritating character of the fæcal discharges.

The ætiology of the condition is obscure. In some cases I have suspected an irritating quality in the meconium, in others the accidental introduction of irritating fluid into the infant's rectum during delivery, but I have as yet not been able to reach any definite conclusion.

This condition is most successfully and quickly righted by deep cleansing injections. Usually a solution of salt and water( ℥ ss.-i.to f℥ viii.)warmed to a temperature of 98° is all that is required. A fountain syringe is the best instrument to employ, and in giving the injection the reservoir should be elevated only so high that the fluid will run into the gut freely, not forcibly. Of the solution, from two to eight ounces may be used at each washing, in other words, enough to thoroughly cleanse the rectum. These washings may with advantage be immediately followed by bland enemas, as olive oil or olive oil combined with lime water, in quantities small enough to be readily retained—two fluidrachms for example.

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In obstinate and chronic cases, it is often necessary to begin the local treatment by injections of nitrate of silver. For this purpose a solution of one-half to one grain of the nitrate to each fluidounce of distilled water is sufficiently strong, and two fluidounces is the usual quantity for each injection. Before injecting the silver solution the gut should be thoroughly cleansed by a simple warm water enema, and five or ten minutes after its introduction a free re-washing with a solution of salt and water must be effected in order to completely remove or neutralize any excess of the silver salt. From one to three nitrate of silver injections, given at intervals of three or four days, usually suffice to start the reparative process, which is then readily carried to a successful issue by the simpler treatment already detailed.

To relieve the irritation of the skin around the anus it is important to forbid the use of water in cleaning the parts after an evacuation, using in its place olive oil soaked into pledgets of absorbent cotton. Oxide of zinc ointment and the preparation known as jelly of witch-hazel are useful healing applications.

The general treatment demands only regulation of the food supply and attention to the other hygienic requirements of the infant and mother. If there be evidences of impaired gastric or intestinal function, pepsin or pancreatin are indicated; an occasional laxative dose of castor oil may be necessary, and perhaps toward the end of the attack, a tonic.

DISCUSSION.

Dr. FRUITNIGHT said that during the past year, a child, two years of age, in St. John's Guild Hospital, presented the same symptoms, but of much more severe grade, the inflammation extending around the rectum, causing a periproctitis and an abscess, which required to be opened. The treatment consisted in the use of copious injections of boracic acid solution. The child came from a poor tenement district and suffered much from indigestion. In addition to the local treatment, iodide of iron was given internally, and after about two weeks, it entirely recovered.

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Dr. CHRISTOPHER was reminded of a recent case in which two ulcers formed at the back of the mouth in a child of three months. They were produced evidently by the use of the nipple. Subsequently the case developed a form of diarrhœa which terminated fatally. He thought the diarrhœa was produced by infection at the point of ulceration in the mouth. It was certainly not in the bowel itself. It could be classed as a true septicæmia.

Dr. STARR added that nearly all of the cases he had seen —ten or twelve in number—had been among the better class; two or three had been breast-fed entirely, and the milk was apparently of good quality. The case reported continues to be nursed, and is now a perfectly healthy, well-nourished child. One of the cases that had ulceration on the palate was breast-fed, and there was a history of the obstetrician having introduced his finger into the mouth to clear away mucus on account of difficult breathing at the time of its birth; hence the ulceration may have been the result of mechanical violence He detailed the case because it was an average one. In some cases, in addition to the mucous discharges, there was more or less blood mixed with the mucus. In his cases there has been no gastric trouble; the disease seemed to be confined entirely to the rectum and portion of intestine just above the rectum, and the ordinary treatment for the diarrhœa of indigestion or bad feeding had been tried without avail.

Dr. JACOBI said he wished to exculpate, if necessary, the obstetrician who put his finger in the baby's mouth. He could not understand how an injury could jump from the mouth to the rectum without to some extent affecting the œsophagus, stomach or other portions of the gastro-enteric tract. A proctitis is either descending, ascending, or originates *in loco*. If descending, it must come from a colitis, or from some abnormal condition in the colon; if ascending, it comes from the anus, and such cases are not at all infrequent. It may result from hard, soiled diapers, or from the oïdum albicans, or some other microbe. Locally, it may be the result of direct injury—he had seen this at least once, as a result of a scratch from a syringe nozzle. Frequently it is descending, although it does not appear so. Putrefaction is not at all uncommon in the intestine of the newly born and the very young nursling, and there may be a considerable amount of lactic acid or acetic acid in the lower colon, which is irritating, and will produce a colitis and a proctitis. Regarding the treatment, he said he would like to

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warn against the use of nitrate of silver. He had given up its use in such cases, as in other cases of colo-proctitis, for it is very apt, even when the injections are carefully administered by the physician himself, to corrode the anus a little, thus causing more tenesmus. Half a grain to one grain of nitrate of silver to one or two ounces of water he considered too strong. In his opinion, injections of starch water or mucilage, or of bismuth shaken up with water, will act better.

Dr. KOPLIK said he wished to call attention to the fact that these ulcers at the junction of the hard and soft palate are septic, and are due to direct friction with the finger.

Dr. JACOBI added that frequently where over-feeding does not result in gastritis or enteritis, it shows itself in the last part of the intestine.

Dr. STARR, in closing, said that he did not mean to suggest that the mouth trouble went to the rectum; he merely mentioned it as a coincidence. He only used the nitrate of silver injections in excessively chronic cases, and then carefully administered them himself.

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## BRIEF NOTES ON THE USE OF ANTIPYRETIC DRUGS IN THE FEBRILE AFFECTIONS OF CHILDREN.

BY J. P. CROZER GRIFFITH, M.D.,

Clinical Professor of the Diseases of Children in the University of Pennsylvania; Professor of Clinical Medicine in the Philadelphia Polyclinic; Physician to the Children's Hospital.

THE theory has fortunately long been abandoned that it was the physician's duty to interfere with every instance of elevation of temperature reaching what might be called moderately high fever. The general consensus of medical opinion still is, however, that under certain conditions the effort to reduce fever should certainly be made. It is generally admitted that the remarkably high temperature sometimes seen in sun-stroke, tetanus, urethral fever, and some other conditions is itself dangerous to life, or, at least, that if it continue long, life will cease. It also

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seems certain that prolonged hyperpyrexia, such as occurs in many cases of typhoid fever, is attended by danger, even though the fever be not so excessive as in the diseases mentioned. It is possible that it is not the pyrexia itself which is the cause of dangerous symptoms, but that some, at least, of these symptoms are, with the pyrexia, the result of different modes of action upon the body of one and the same deleterious cause. In any case many of the means employed to reduce the fever act favorably upon the other symptoms and upon the course of the disease.

The fact that the chemical antipyretics are capable of producing very great reduction of temperature is well know to everyone, and I need not call it to mind. The other fact, that they may prove of great value by removing threatening nervous symptoms through, or simultaneously with, this reduction is also known, but under the influence of the prevailing enthusiasm for cold water treatment, is often apt to be forgotten. It is with the purpose of emphasizing this valuable power that I have selected a few brief notes of certain illustrative cases.

Nothing in this paper is in any sense intended as in opposition to the use of cold water in such diseases as typhoid fever or heat stroke. In the prolonged pyrexia of the former, experience has shown that the cold bath is probably less dangerous and much more effectual than the employment of the chemical antipyretics. There has arisen a wholesome and largely justifiable dread of these drugs in asthenic febrile states. Then, too, in conditions of very great pyrexia with unconsciousness, as seen in sun stroke, probably no means is so useful as the ice water bath. In certain other of the febrile diseases of childhood, however, and somtimes even in typhoid fever, the case is quite different. It is very questionable whether more harm may not be done to a crying, exited, unreasoning child by placing it in a cold bath, or even by cold sponging than would result from letting the fever have its course; and it is often to be well considered whether it is not better to administer an antipyretic drug.

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The whole question of the use of antipyretic measures in children is, to me at least, a most interesting one. It is the experience of every physician that elevation of temperature in children is often apt to be excessive from very slight causes, and that high fever is often borne by them surprisingly well. On the other hand the nervous system of the children is affected with peculiar ease, and the high fever often becomes the cause or the index in them of dangerous nervous symptoms, such as impending convultions. In such cases it always seems to me advisable to reduce the temperature at once, lest the nervous symptoms pass beyond control.

It is therefore not so much the presence of high temperature alone, as the existence of nervous symptoms accompanying it which is to be the indication for the employment of antipyretic measures.

Regarding, now, the susceptibility of children to the chemical antipyretics, my own experience is entirely in accord with that of those who claim that these remedies are borne by children surprisingly well and in doses larger than dose suited for adults, and that their action is very satisfactory. I have frequently seen a single dose of an antipyretic produce most gratifying results and entirely alter the whole outlook of the case.

Some dangers, of course, exist, as with every form of treatment, but so far as my experience goes, there is less danger of depression of strength in children than in adults.

The clinical records which follow are in evidence of the value of this method of treatment. That thallin is the drug used in all of them is due to the fact that I was employing it largely at the time most of the records were made; not to any special predeliction for it. There are other antipyretics which are free from its disadvantages. It is to be noted, in passing, that Steffen has spoken most highly of this drug for febrile affections in children. In my hands its action has been prompt, energetic and easily controlled, and I have never witnessed any depression of strength produced by it.

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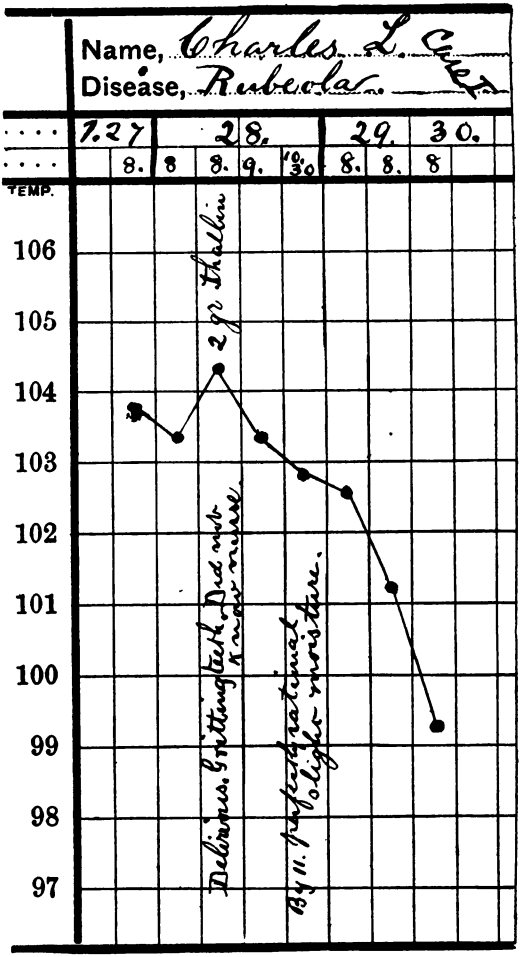
CASE I.—*Rubeola.*—Charles L., nine years old. Jan. 26th, Drowsy, sneezing, coughing, nose-bleed; 27th, characteristic eruption; symptoms continued; 28th, diarrhœa, nose-bleed several times. At 8 P.M., delirious, grinding teeth, did not recognize nurse. T. 104.2° Given




2 grains thallin. By 11 P.M. temperature had fallen only 1.6 F., with very little perspiration, yet even by a half hour before this the child had become perfectly rational, and had lost all nervous symptoms. Slept quietly the rest of the night.

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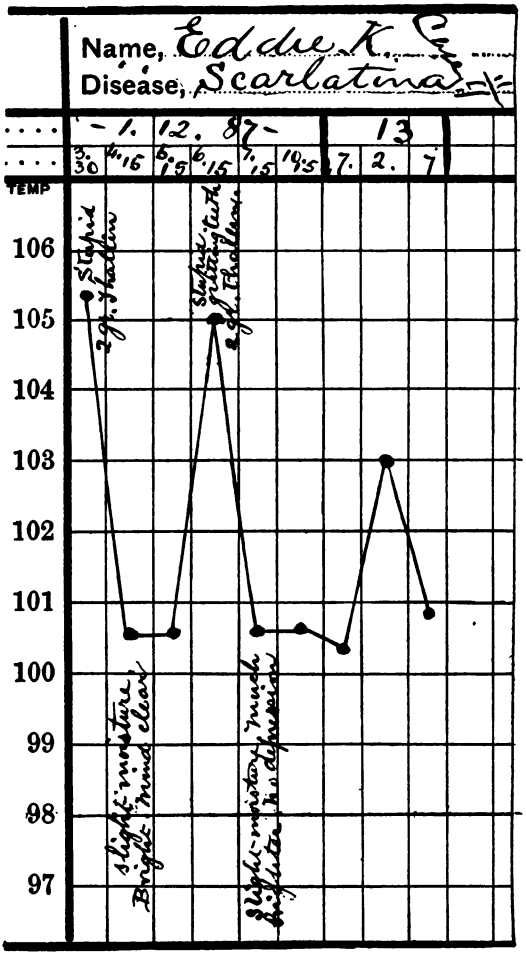
This case shows that sometimes even a slight fall of temperature is all that is needed to accomplish the removal of the severe nervous symptoms.




CASE II.—*Scarlatina.*—Eddie K., aged nine years. Jan. 11th, sore throat, fever, slight redness of body; 12th, vomited in night and again in morning. Poorly developed brownish-red eruption; child seemed very stupid and scarcely comprehended questions put to him. Did not recognize those about him; could scarcely be

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made to open his mouth. At 3.30 P.M. T. 105 2°. Given 2 grains thallin. In three quarters of an hour temperature had fallen nearly 5 degrees; only slight perspiration; child quite bright and with entirely clear intellect. Later in the day temperature rose again to 105° and the previous nervous symptoms returned, with gritting of the teeth. 2 grains of thallin produced in an hour decided fall of temperature with removal of all nervous symptoms and with but slight perspiration.

The results in this case were equally good with those in Case I. The difference in the degree of action upon the temperature in the two cases is worthy of note. This evidently depends simply on idiosyncracy. As in adults, the susceptibility varies greatly in different children, independently of the nature and stage of the disease, which likewise exert a powerful influence.

CASE III.—*Rubeola.*—Willie J., aged three and a half years. Jan. 28th, after prodromal symptoms during the day, an indistinct rash developed towards evening; 30th, rash still illy defined; child moaning and fretful. At 9 P.M. child unconscious, hands clenched, eyes rolling and staring, mouth frothing. T. 105.2°. 1 grain thallin given with little effect, and dose repeated at 11.30 P.M. 31st, at 1 P.M., one and a half hours after the second dose of thallin, the child was sweating freely, with mind clear and all nervous symptoms gone; he then slept, though restlessly. By 8 P.M. temperature had again risen to 103.4° and the child was in the same convulsive condition as before; all the previous nervous symptoms, except the clenching of the hands, having returned. 1 grain thallin given. In one and a half hours all bad symptoms had disappeard. Feb. 3d, 4th and 5th, the temperature again rose to 103° or over on each of these days, the rise depending upon an attendant bronchitis, but no nervous symptoms developed.

This case well illustrates the value of chemical antipyretics in removing most threatening symptoms. It is likewise a good illustration of the fact to which I have already, referred that it is apparently not always the mere height of the fever which produces the dangerous symptoms, but that there is sometimes brought about in some-way, particularly in the earlier stages of infectious diseases, a peculiarly irritable condition of the nervous

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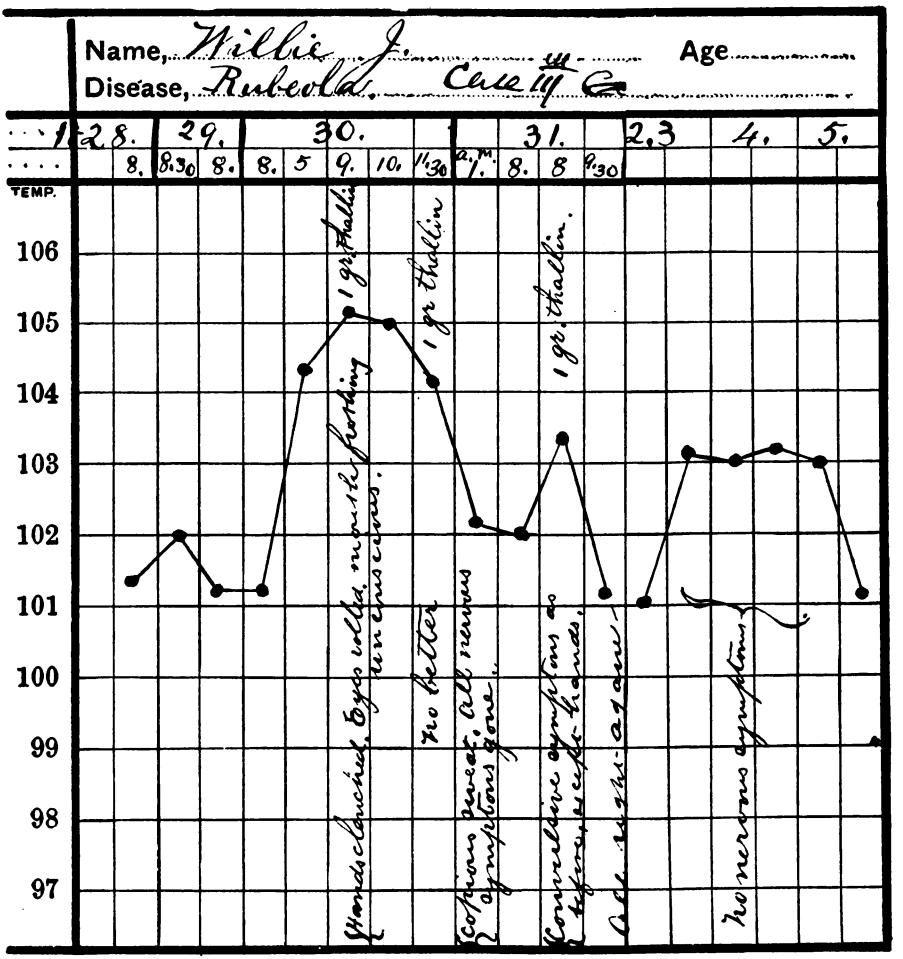
system. Thus on Jan. 31st, a temperature of 102.4°, was attended by commencing convulsions, while on Feb. 3d, 4th and 5th a temperature of 103° or 103.2° was developed entirely without nervous phenomena. Whether the




drugs relieve the nervous symptoms by reducing the fever, or whether they really act as nervous sedatives, apart from the lowering of temperature as already intimated, is an interesting question difficult of solution.

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However this may be, the practical inference is that the nervous symptoms and not the degree of pyrexia constitute the indication for treatment.

CASE IV.—*Diphtheria.*—Adolphus D., aged ten and a half years. March 12th, sore throat; 15th, Pseudo-membrane on tonsils; 16th, temperature at 1 P.M., 103.6°. Child delirious. 2 grains thallin given. At 3 P.M. little effect had been produced. T. 102.6°. 2 more grains thallin administered. At 5 P.M. child's mental and general condition decidedly better. T. 101.4°.

This case, although showing to some extent the favorable action of antipyretics upon the nervous state, is still more an instance of the tolerance of antipyretic drugs which children often exhibit. 4 grains of thallin may be considered the full adult dose, equal to at least 8 grains of antipyrine in strength.

CASE V.—*Pneumonia following Rubella.*—D. C., aged nine years. March 9th, without previous symptoms eruption appeared in the morning; 11th, rash nearly gone; 19th, pain in side, cough, physical signs of incipient pneumonia in right lower lobe; 21st, at 4.30 P.M. T. 106.5°, physical signs of consolidation, constant severe pain in side, heart's action violent, child nervous, sleepless tremulous. Given 3 grains thallin.

At 8 P.M. T. 101°, free perspiration, child less nervous, pain gone, heart's action much quieter. Child felt better and went to sleep. Thallin was given after this date on several occasions when the temperature reached 105°. Its administration was always followed by disappearance of unpleasant symptoms.

CASE VI.—*Rubeola.*—D. C., aged ten years. (Same child as Case V.) Jan. 25th, eyes swollen; 26th, marked lachrymation, sneezing, cough, face greatly swollen; very nervous. Rash appeard later in the day. By 8 P.M., wildly delirious, knew no one, sang, gritted the teeth, got out of bed and in again with his head toward the foot. T. 104°. Given 1 grain thallin. By 9 P.M., slight improvement. By 10 P.M., talking rational. T. 101.2°. Soon fell asleep and slept quietly through the night. 27th,

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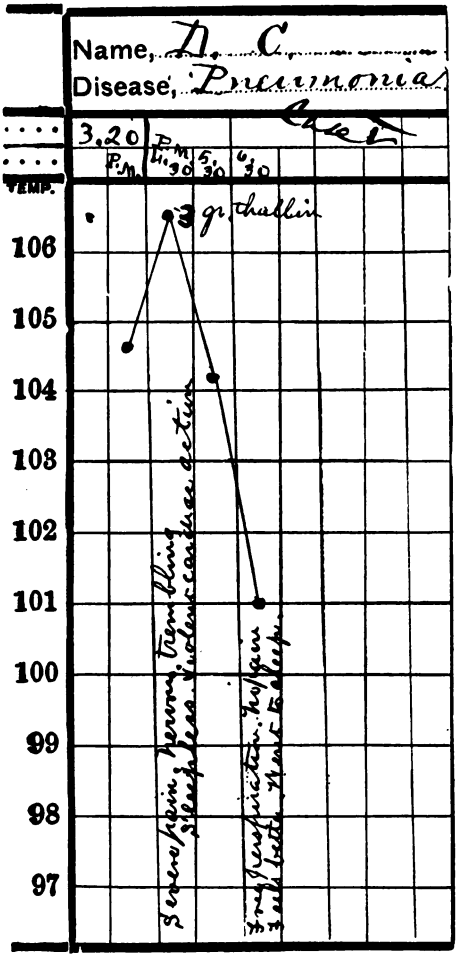
at 8 P.M. temperature rose to 103.6°, but there were no attendant nervous symptoms; 28th, temperature in the morning 103 2°




These case resembles Case III. in the fact that although the rise of temperature on the 20th and 28th was almost as great as upon the 26th, the child was free from any marked nervous phenomena. Upon the 28th he felt so well that he asked for a book.

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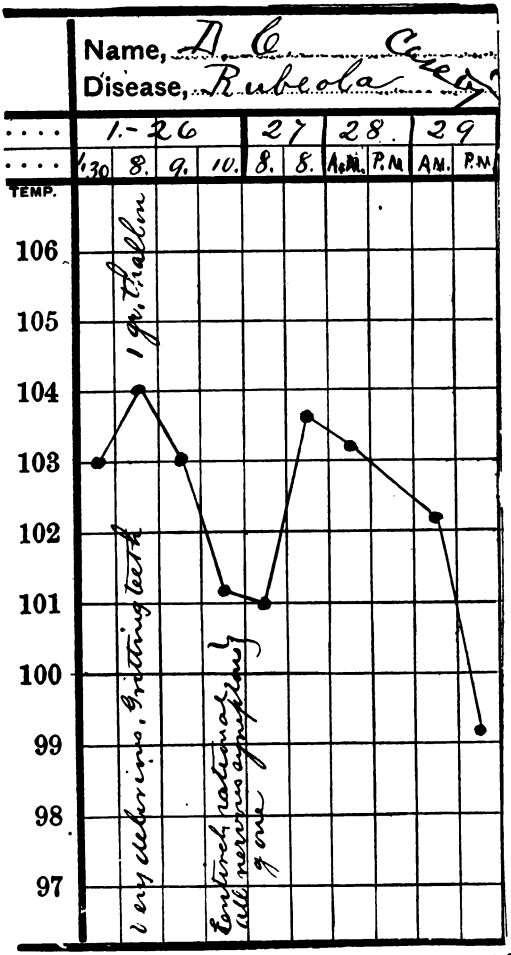
CASE VII.—*Rubeola.*—Susie A., aged seven years. Jan. 26th, prodromal symptoms of measels observed; 27th, rash beginning; 28th, tongue dry, nose-bleed. At 8.30 P.M., T. 104.2°, delirious, would not stay in bed, gritting teeth, did not recognize nurse. 1 grain tallhin




given. By 9.30 P.M., T. 103.6° and by 11 P.M., T. 102.8°. By 10.30 P.M. she had become entirely rational, all nervous symptoms had disappeared and she felt much better.

It will be observed here, as in Case I., that only a moderate fall of temperature 1.4° F. was attended by complete removal of all unpleasant symptoms.

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CASE VIII.—*Pneumonia.*—Simon R., aged seven years. Feb. 5th, in evening became sleepy, then delirious; twitching; high fever; 6th, pain in right side; morning temperature 101.4°, often delirious through day. No cough. No physical signs. 7th, morning temperature, 104.4°. Much pain in side; slight expiratory moan. Evening temperature 104.8°. Very stupid; some dulness on percussion; with fine râles over right base. 3 grains thallin, at 5.30 P.M., was followed in about two hours by entire relief of stupid condition. 8th, at 9 A.M., very hot; delirious; twitching. 3 grains thallin given. At 10.30 A.M., copious perspiration; child entirely rational. F. 100°.

CASE IX.—*Rubeola.*—Theodore M., aged nine years. Jan. 26th, coughing; sneezing; drowsy; 27th, vomited, eyes red, nose running, indistinct rash on face; 28th. rash developing. 8.30 P.M., very delirious; could not be kept in bed; nose bleed; gritting teeth; pulling covers from bed. T. 104°. 2 grains thallin given. 9.30 P.M., much same. 10 P.M., copious perspiration; nervous symptoms improving. 11 P.M., T. 101.6°; child perfectly rational. Slept quietly from this time on through the night. 29th, rash very abundant; diarrhœa; nose-bleed. In evening a chill; followed shortly, at 8 P.M., by a temperature of 105.2°; child delirious, gritting teeth. 2 grains thallin given. By 10.30 P.M. no better; no sweating. Dose of thallin repeated. By 11 P.M. temperature had fallen to 100.2°, with copious prespiration. Child conscious; all nervous symptoms gone. Slept through remainder of night.

Like Case II., a considerable fall of temperature was required before improvement in other symptoms took place. Unlike it, however, it was necessary on one occasion to administer 4 grains of the drug in two divided doses. The tolerance for thallin was as great as in Case IV.

CASE X.—*Scarlatina.*—Barbara B.; aged nine and a half years. Oct. 2nd, sore throat; vomited; 4th, rash appeared in morning, tonsils swollen; throat bright red; 5th, at 8 P.M., T. 105.8°; child tossing; delirious. 2 grains thallin given. By 9 P.M., temperature had fallen to 103°.; delirium had ceased; restlessness diminished and the child remained more comfortable throughout the rest of the night.

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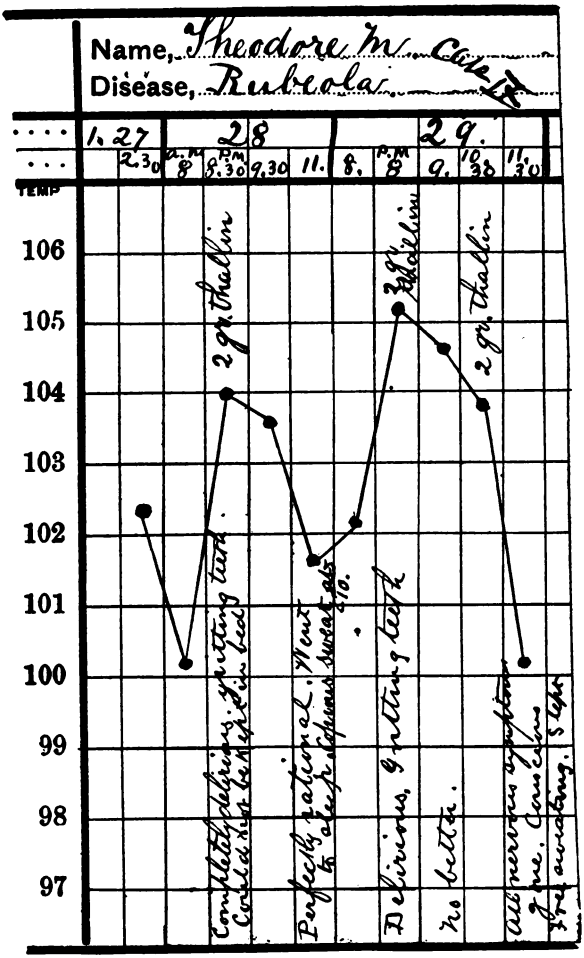


DISCUSSION.

DR. CHRISTOPHER said he had felt we would be depriving ourselves of important aid if we did away with the modern antipyretics. They are particularly valuable where cold water is not applicable. The degree of elevation of temperature is certainly less important in children than the accompanying nervous symptoms, and these should be treated irrespective of the temperature. Thus a temperature of 105° without nervous symptoms requires

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no treatment, whereas a temperature of 101°, with marked nervous manifestations, should receive prompt and active treatment. A moderate dose of antipyretic in a pneumonia associated with cerebral symptoms had often proved most advantageous. But the modern antipyretics should not be used continuously for a great length of time; in fevers, which are themselves continuous, they add to the danger. Their occasional administration, is, however, of service.

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## THE DIETETIC TREATMENT OF CHRONIC CONSTIPATION IN INFANCY.

BY L. EMMETT HOLT, M.D.,

New York.

IN order that the bowels may move regularly it is necessary that there should be a certain bulk to the fecal mass. In adults this bulk is largely made up from the green vegetables, pulp of fruit, husks of cereals, etc.

In infancy, or at least while the child is upon an exclusive diet of milk, the bulk of the stool must be furnished by the fat and the casein, since the sugar leaves no residue of importance.

Which of these two, the fat or the casein, is the more important in giving the proper bulk and consistency to the stool may be determined partly from analyses of infants' stools and partly from clinical observations made on nursing infants and those fed on cow's milk. The ideal stool of a perfectly healthy nursing infant contains in its dry residue, according to the latest and best analyses, from twenty to forty per cent. fat; this being by far the largest single ingredient. This indicates that nature requires that the infant's food shall contain much more fat than can be absorbed. The use of this excess seems to be to keep the bowels in a proper condition.

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Habitual constipation among nursing infants is usually seen in those who are gaining slowly or who do not thrive at all at the breast and in these cases the examination of the milk, in the great proportion at least, shows it to be deficient in fat. The casein at the same time is apt to be in excess, rarely is it deficient.

But not all infants who are habitually constipated while nursing do badly; some exhibit all the other symptoms of healthy nutrition. It appears to be true in such cases that enough fat may be supplied in the food for the requirements of nutrition, but that the excess is very inconsiderable and not enough to regulate the action of the intestines.

When we turn to infants fed upon cow's milk simply diluted with water, or upon condensed milk we find constipation is the rule and not the exception. In fact how to overcome this troublesome symptom is one of the greatest problems in artificial feeding.

Good breast-milk contains an average of about four per cent. fat, the average cow's milk contains about one-half per cent. less. An infant, then, who is fed upon cow's milk diluted with an equal quantity of water, get only one and three-fourths per cent. fat instead of four per cent., and if the dilution is one part of milk and two parts of water, the proportion of fat is reduced to a little over one per cent., about one-fourth that furnished by good breast-milk.

What is the effect of this food upon the stools? Since the fat is nearly all absorbed they consist principally of casein residue which forms hard, dry masses often resembling marbles. It is true that notwithstanding such stools and the great discomfort caused by the constipation and the associated flatulence, the child's nutirtion may not suffer greatly and he may continue to be so well nourished that the mother and often the physician may take it for granted that the food is all right and settle down to the habitual use of laxatives or suppositories for the remainder of the first year. That the trouble in such cases is not at least chiefly due to an

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excess of casein may be readily shown in any case by substituting for the cow's milk a cream containing twelve per cent. fat and diluting this with twice its bulk of water. Such a cream contains about the same proportion of casein as the milk, but the great increase in the fat at once shows its effect in the stools. In the majority of cases they immediately become softer, yellow and buttery in consistence.

The normal stool is obtained with most artificially-fed infants when the fat in the food is increased to about four per cent. or the proportion present in good breast-milk. In a few cases, however, five per cent. is required, and in some rare instances I have been obliged to increase the fat to six per cent. in order to secure a proper action of the bowels. Following out this idea of regulating the character of the stools by the percentage of fat in the food, chronic constipation in artificially fed infants has come to be, during the past two or three years of my experience, a rare occurrence.

In breast-fed children it is not quite so easy to regulate the fat. Where the analysis of the milk shows it to be deficient in fat, the best plan has seemed to me to be to give the infant just before nursing from one to three teaspoonfuls of cream ; the dose being regulated according to the age of the child and the degree of constipation. In order to reduce the excess of casein which is frequently associated, it is desirable that the mother shall have plenty of exercise in the open air.

The use of cane-sugar or milk-sugar seems to me to have little or no effect on the constipation ; if anything, it is increased thereby, since the common complaint among dispensary patients where condensed milk is used exclusively, has been habitual constipation.

The malted foods have a great reputation among the laity for infantile constipation, and we cannot deny that this is well founded. This may in part depend upon the unabsorbed residue of cellulose, gum, resin, etc., which they leave behind, but it is principally due to the laxative effects of the maltose itself.

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Starchy foods, as a rule, tend to increase constipation, for although they add to the bulk of the stool, the condition of intestinal putrefaction which they are likely to set up in the end makes the constipation worse in most instances. This applies to barley-water, farina, arrow-root, and to Imperial Granum, Ridge's Food, Hubbell's Wheat, and all similar preparations. Oatmeal has seemed to me to act chiefly mechanically by the small husks and coarse particles which it contains, since when cooked long and strained through a fine sieve it has very little effect and acts only like any other starchy foods.

In conclusion the chief dietetic cause of constipation among infants during the first year is deficiency of fat in the food. The constipation is aggravated if there is at the same time an excess of casein. If from the beginning a proper amount of fat, about four per cent., is furnished, the habit of obstinate constipation does not become established, and the bowels are easily kept in proper condition. If, however, on account of improper feeding, the constipated habit has become established, more difficulty is experienced in overcoming this, and the dietetic treatment alone may not suffice, but it is certainly the most important element in the successful treatment of every case. It sometimes happens that the stomach may not tolerate a food which contains the required amount of fat, although I have very rarely found this to be the case. These complicated cases, of course require special treatment.

The value of cream in the treatment of habitual constipation in children from one to four years of age is almost as great as during the first year of life, although difficulty is sometimes experienced in getting the child to take the proper amount.

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# THE MEDICINAL TREATMENT OF CONSTIPATION IN EARLY INFANCY.

BY CHARLES S. PUTNAM, M.D.,

Boston.

BY one or another accident or neglect the bowels of infants are sometimes found to contain masses of fæcal material which have to be removed in order to relieve pain or some other immediate injury. Tumors and other mechanical obstructions may also interfere with the normal evacuation of the bowels.

I take it that this discussion is not intended to concern itself with these phases of constipation, but only with that chronic condition which does not appear to be a result of any well-marked morbid changes. It is, of course, because of this peculiarity that though really a symptom, constipation is often treated, as we are now treating it, like an independent disease.

The medicinal treatment of this chronic constipation in young infants is highly unsatisfactory, and is for this very reason, perhaps, passed over by most authors in a way that is equally unsatisfactory. They advert perhaps to the difference between an accidental accumulation in the bowels and this chronic retardation, but nevertheless simply recommend for the latter a number of drugs and formulas, as if the only aim were to get the bowels emptied in the easiest and most expeditious way, regardless of what is to happen in the future. To this statement, however, there are many exceptions and notably among the members of this Society.

Unhappily, the name of a drug attracts attention while the warning against the use of it goes unnoticed, and so a cathartic medicine is often given day after day, when by paying attention to the origin of the constipation it might be cured.

No doubt every member of this Society puts the medi-

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cinal treatment last and before taking it up exhausts every possible means of removing its underlying causes of the constipation, depending naturally, for the most part, on the regulation of the diet.

It is not my part on this occasion to speak of the more satisfactory ways of treating constipation in infants, among which the arrangement of the food is the most important. But I may be permitted to say that constipation is less common than formerly, at least, in well-to-do families, because of the improvements that have been made of late in the composition of the food of infants.

When we have disposed of cases of constipation, as far as possible, by other methods of treatment, there still remains a few for which we resort to medicine, and no doubt some of these also could be referred to the diet treatment were we always able to obtain just the diet that the case demands.

Constipation is usually treated with laxative medicines and there is an apparent paradox in the common use of laxatives in diarrhœa diseases also. The explanation is, of course, that we do not treat the diarrhœa, but neglect it or even aggravate it until we are rid of the decomposing matters that have given rise to it.

It would be well if we could in every case neglect constipation also and devote ourselves to getting rid of its underlying cause. Unfortunately we feel driven to take up cathartic medicine when we cannot (and, perhaps, oftener still when we really could) accomplish a cure by letting the constipation alone as far as drugs are concerned. Certainly it may be said in general that medicines which directly relax the bowels will indirectly lead to more constipation. Yet we use them in spite of this objection (some of us, no doubt, more often than we ought), just as firemen blow up and throw down houses around a conflagration, thereby making the havoc temporarily worse, to prevent the fire from doing still greater harm by spreading.

We may, however, well question whether the use of cathartics in constipation has been on the whole more

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beneficial or more injurious. I incline to the latter alternative.

The objection to the use of cathartic medicines is that the system either becomes habituated to, or is actually injured by, them in a way which may, to a greater or less extent, counterbalance their usefulness. This acquired tolerance of any medicine stands almost in direct relation to its activity.

In one way it is more harmful when an infant becomes thus habituated to a drug, because we cannot call in its will to assist in giving it up. In another way it is less harmful, because we can take the drug away by force more easily than from an adult.

It is important to determine for each case whether it demands the use of medicines, and in coming to this decision I believe that we ought to be very patient and circumspect.

The number of times a day or week the bowels move of themselves is not enough of a guide. There is a great difference among individuals. One will suffer unless there is a daily evacuation, others go several days without any suffering at all. Often by patience the use of medicine can be avoided, and I cannot subscribe to the rule which is often given that we should interfere whenever there is not at least one operation a day. The decision should rest entirely on the results of leaving the bowels to themselves. We may have to interfere, in the first place, when the nervous system is decidedly irritated by overfilling of some part of the intestine; second, when the intestines themselves are evidently distended or irritated. Not infrequently it happens that waiting is rewarded by a successful effort of nature to accomplish that for which we had almost begun a course of medicine.

When the constipation depends on sluggishness of the lower end of the bowel, it is very rarely desirable to use medicines at all. They are chiefly of use when the upper part of the bowels are sluggish and the secretions scanty, so that the fæces move along slowly and become hard and dry in the process.

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In general, we ought to determine for each case what is its weakest point in the mechanism of this process and give it precisely the aid which it needs.

Some writers maintain that laxatives are always preferable to enemata, while enemata likewise have equally stout defenders.

But such opinions are misleading, for each method has its own sphere and one will be effective when the other is of no use.

Writers also differ as to whether it is better to give an occasional dose of cathartic medicine or a continuous one. But here, again, we have to look at the special demands of the case. If an occasional fillip will keep the bowels measurably up to the mark it is better not to give a dose every day, but if occasional doses lead to alternation of severe diarrhœa and constipation the method is unsatisfactory.

A long list of cathartics has been recommended, but I shall only speak of those most commonly used and of those that I consider are the most useful and the least harmful.

Castor oil has been and is still recommended by many authors, and is often used for chronic constipation, but it seems to me objectionable. In small doses it disturbs the digestion; in a dose large enough to produce a perceptible effect it leads to a reaction which generally makes the constipation worse than ever. Calomel and grey powder, valuable as they are for occasional cathartics, especially for diarrhœa, are, for somewhat simliar reasons objectionable for constipation. Among the vegetable cathartics—senna, rhubarb, jalap, podophyllin, etc.,—rhubarb has generally had the best reputation, but I think that it is uncertain in its effects and that its main advantage is that it is agreeable to take. It has seemed to me that senna, which can be taken without great difficulty in the form of compound licorice powder, is less likely to lose its effect. Podophyllin, which does very well for prolonged use in cases of older children, may also be good for infants, but it is for some reason very

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difficult to administer. Magnesia is of use for neutralizing acidity, but I think it very unsatisfactory as a cathartic, because it does but little good in small doses and cannot be repeated too often in large doses.

For a saline cathartic I rely on phosphate of soda for the most part. Belladonna, nux vomica and calabar bean ought to be very useful and are strongly recommended by writers, but I have not obtained any striking results with them in early infancy, either because I have been afraid to use them in sufficiently large quantities or for some other reason, though it is true that as far as they are practicable, they are better than the ordinary cathartics and salines.

The value of tonics should not be overlooked in cases where they are needed, but on the other hand constipation may occur in infants of great apparent vigor.

Oil (olive or cod liver) occupies a place between food and drugs. A small quantity may be made (especially the olive oil) an integral part of each meal, having been emulsified with lime water or some other alkali.

In this paper I have said more about the question of using drugs than about the drugs themselves, and have tried to indicate (1) that there are grave objections to the use of drugs in constipation of early infancy; (2) that there are yet a few cases where we are driven to the use of drugs rather than to leave them alone, and that certain drugs are better than others for this purpose, those which I prefer being senna (compound licorice powder) for a vegetable, phosphate of soda for a saline and emulsified oil, in small doses, made an integral part of the food.

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# THE LOCAL TREATMENT OF CONSTIPATION IN EARLY INFANCY.

BY LEROY M. YALE, M.D.,

New York.

*Mr. President:*

IF I rightly interpret the duty you have assigned me, it is to present a few points concerning the local treatment of infantile constipation, to stimulate discussion and elicit experience.

We are all agreed that dietetic correction, if possible, is on all accounts the best means, but in practice we find, whether through our own fault or not, that a certain proportion of infants do remain constipated. These we must in some way care for until the child is old enough to take some amount of solid or semi-solid food.

I would particularly invite discussion of three remedies or groups of remedies, viz., massage of the abdomen, suppositories and enemata. Whenever any local remedy is systematically employed, a difficulty arises in determining its actual value, because the elements of regularity or of habit thus introduced is itself of the very first importance. In fact if the regular exciting of attention and expectation by placing the child upon the vessel might be considered a local remedy, I should place it before any other.

The measures above mentioned are not equally applicable to all types of constipation, massage, perhaps, to more than the others. When applied intelligently and faithfully, even if unscientifically, it has seemed to me a valuable remedy. The method I have, on account of its simplicity, recommended to mothers and attendants is as follows, the parts, of course, being pointed out, not designated by their anatomical names: Using the tips or last joints of the fingers of one hand, oiled if the skin of the

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infant shows signs of irritation, begin over the cæcum to make small circular movements, advancing up the ascending colon to the hypochondrium, across to the opposite side (and I should say that it is best done when the stomach is not full), and downward over the descending colon. In going up the upward stroke is emphasized, in going down the downward, as if the fingers were pushing a mass along the canal. This is continued for five minutes once a day, increasing to ten minutes and twice a day if once is not sufficient. Favorable results from this method have been reported to me, by it the bowels being kept in good condition until a change to a more laxative diet was proper and possible. Whether in the absence of such dietetic assistance the relief of the constipation would long remain after the cessation of the manipulations, I cannot surely say, although I believe that the regularity thus established would be a continued benefit.

The more elaborate method of Karnitsky I have not tried, but I am ready to believe that if well carried out it would be more efficient than that described.

If I am not mistaken, the type of constipation I most frequently meet in practice is that in which the fæcal mass descends to the rectum with reasonable promptness but for some reason is extruded with reluctance and difficulty To this type the ordinary forms of local remedies are most applicable, as I believe.

It has seemed to me that a mechanical cause for this variety of constipation often exists in the posture in which the child is placed. The soft normal stool of early infancy is expelled with practically no difficulty in any posture, but if the stool is firm this is not so. Everyone knows that the posture most favorable to the thorough emptying of the rectum is that known as squatting. When the child is old enough to be placed upon a commode chair it is often in such a position as to make defecation very difficult indeed. Its trunk is bolt upright, the feet dangle from a seat which is too high, and the expulsive power of the abdominal muscles is reduced to a minimum. Besides the aperture in the seat is so wide that no

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support is given to the tubera ischii, the gluteal masses are crowded together instead of separated, and the descent of the floor of the perinæum is much hindered. Of course the rachitic infant with fat, soft buttocks, protuberant or perhaps pendulous abdomen and a tough caseous or starchy mass to expel is at a special disadvantage. In such cases the use of a low, small vessel is often successful when the commode has failed.

I shall be very glad if I can elicit the experience of the members here present as to both the advantages and disadvantages of suppositories and enemata and as to their relative value.

Of suppositories or substances introduced in the same way many can have only a mechanical power of stimulation; indeed, it seems to me, little effect at all beyond the mental suggestion. Such notably are the introduction of an unattached syringe nozzle or an oiled cone of rolled paper, both of which are of established efficiency, as in fact I have in some instances known the simple warming of the vessel to be. The variety of constipation so relieved, and in my experience it is common, must be mainly or solely the effect of habit or inadvertence, or in nursery parlance, "just laziness."

But other suppositories have a decided potency as rectal stimulants, even when almost immediately expelled. There is a great variety of them in use, from the domestic cone of molasses candy or soap to the much-used glycerine suppository, or those containing drugs of more than local action.

Some good authorities have objected to the use of suppositories as producing local irritation or inflammation, and I think Baginsky makes this charge especially against soap. While it is easy to see that it may be so, personally I have had the good fortune to have rarely observed any irritation. Mechanical violence due to hard, large masses, of course, should not be charged to the remedy causing their discharge. Doubtless the quality of the soap will much modify this action, and only such as is suitable for the infant's ordinary toilet should be used.

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Coarse laundry soap is, I am aware, sometimes used in domestic practice as more effective, but I think unwisely. The effects of the glycerine suppositories in use of late years are too well known to need comment, and considerable experience regarding them must have been accumulated. Those medicated suppositories which produce their effect after some hours seem to me to have no advantage over ordinary medication.

I should like to ask if any members have seen constitutional effects from the use of suppositories. I have felt obliged to discourage the use by my patients of a very popular proprietary suppository, sold under a seductively innocent name, because in four or five cases its use was uniformly followed by the appearance of a rash, apparently that of belladonna or its alkaloid. A medical acquaintance has also noticed in one of his patients, a lady, belladonna effects which he was puzzled to account for, until he learned that on her own responsibility she habitually made use of these suppositories. Ordinarily doubtless they are harmless, but one would prefer to control the dosage of such a drug.

The effect of enemata is usually more decided than that of suppositories by the distention of the bowel, and as they also, to some extent, break up or diminish the consistency of the fæcal mass, they seem preferable when this latter is usually hard or large. Under these circumstances I have long used enemata of some bland oil simply for mechanical lubrication of the masses and the parts through which they must pass. So also I used the glycerine enema for some years before I was aware of its powerful stimulating effect.

It is often asked or charged that the habitual use of enemata does impair the power of the bowel by over distention. I have never been able to quite satisfy myself on this point; that is to say, as to whether the distention was due to the enemata or to the retention of the large masses which demanded the enemata for their removal. I have seen, however, a young child while using enemata habitually have stools of a calibre that was remarkably

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large and which diminished notably after laxative diet rendered the enemata no longer necessary. Such a fact can be explained in either way, but I have of late years been inclined to restrict the habitual use of enemata, meaning watery enemata of considerable volume, to those cases in which suppositories were inefficient or irritating. (Of course only ordinary habitual constipation is here considered.)

As to the final effect of these devices, I may say that they, both suppositories and enemata, do not seem to me curative in any marked degree. They usually must be continued more or less until something is accomplished by diet, or in some cases by massage. On the other hand, after such dietetic changes have been, instituted beyond the temporary irritation or dilatation of the bowel already alluded to (and in my experience both are rare), I have not seen any disagreeable effects. The general condition of children so treated is certainly better than that of those whose constipation has been neglected or treated with occasional cathartics, and I think better than of those treated by habitual laxatives.

But on these points I hope to hear from those present.

DISCUSSION.

DR. STARR said in regard to the action of medicated suppositories, that he had been using for two years in cases which did not yield to dietetic treatment and massage, suppositories composed of extract of belladonna gr. 1-24, purified aloes gr. i, and cocoa butter gr. x. They were used at first twice a day, but after a week, only at night, and after a week or two every other day.

DR. FRUITNIGHT remarked that water should not be withheld from constipated infants, as it is useful in reducingthe consistency of the fæces.

DR. F. M. CRANDALL said he had observed some of the effects referred to by Dr. Yale from the use of the proprietary suppositories.

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# HEART STRAIN IN PERTUSSIS, ITS EFFECTS, ITS TREATMENT (THE HEART, THE PULSE, THE GENERAL CIRCULATION, THE KIDNEYS).

BY HENRY KOPLIK, M.D.,

New York City.

THE study of the heart in pertussis is practically a neglected field. The current literature teems with notices upon modes of treatment and remedies which are calculated to exert a semi-specific effect upon the course of pertussis. While attention has been directed toward finding the long desired drug which will have an effect in pertussis much like quinine in malarial fevers, the management of the disease, as we have to confront it to-day, has, I think, been much neglected. Next to the complication of broncho-pneumonia, the effects of the convulsive seizures in the convulsive stage of pertussis upon the circulatory apparatus are not only interesting but most important, and to me it has seemed, from careful study, that the skillful management of these cases, with due regard to the restoration of certain effects of inequality of the powers of the circulatory apparatus, will tend to lighten the severity of pertussis much more than any

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methods now in vogue. The heart is under great strain during the convulsive seizures in pertussis. The leading text-books upon diseases of children note this fact. Henoch notes that in prolonged cases of pertussis, complicated with broncho-pneumonia, fatty degeneration of the heart muscle results. Osler talks in his text-book upon Practice of the immense strain upon the heart, during the paroxysm, and its probable influence as an ætiological factor in causing heart disease in later life. No literature, however, treats of the heart in the interval of the paroxysms. The conditions of the circulation in cases uncomplicated by broncho-pneumonia or marked lung disease (emphysema) are not touched upon in any text-book, nor is there any literature to guide one's studies. I will present to you certain facts which have developed themselves from a clinical and physiological standpoint in my study of pertussis. My experience in this disease extends over the treatment of several hundreds of cases yearly. This will be granted sufficient to give the varied picture which it is necessary to obtain in order to study the phases of this affection. The ages of the patients extend from tender infancy of three to six weeks to ten years. This study is based upon fifty cases in which the convulsive stage could be studied as also the stage of convalescence. My attention in these studies was directed first to the heart, its action during the convulsive seizure and the result upon the heart and the final effects upon the circulation.

*The Heart.*—In order to correctly understand the effects of a paroxysm upon the heart it is necessary to remember that a paroxysm of the pertussis, in the classical language of Niemeyer, "begins with a long drawn, clear, piping sound (produced as the air is slowly drawn into the constricted glottis). Then follows a series of short, rapidly interrupted, expiratory coughs (the air, though vigorously expelled, being unable to force open the glottis for more than a moment at a time), and this, in turn, is succeeded by the crowing, long drawn, inspiratory act." The cough begins with an inspiration, is succeeded by short,

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rapidly following forced expirations and is closed by a forced inspiration. If we consider (Cohnheim) the heart as a suction and force pump alternately the vast importance of remembering the above schema will be apparent. Physiologically considered, the phenomena which confront us in this paroxysm are duplicated in the well-known experiments of Valsalva and J. Müller. Valsalva's experiment deals with the effects of a powerful expiratory effort. In this experiment it is shown that if the thorax be fixed in the position of deepest inspiration and the glottis be then closed and if a powerful expiratory effort be made by bringing into action all the expiratory muscles so as to contract the chest, the cavities of the heart are so compressed that the circulation is temporarily interrupted. In this expiratory phase the elastic traction is very limited and the air in the lungs being under high pressure also acts upon the heart and intra-thoracic great vessels. No blood can pass into the thorax from without, hence the visible veins swell up and become congested. The blood in the lungs is rapidly forced into the left ventricle by the compressed air in the lungs and the blood soon passes out of the chest. The lungs and heart contain little blood. Hence, also, there is a greater supply of blood in the systemic than in the pulmonary circulation and the heart. The heart sounds disappear and the pulse is absent. Müller's experiment is just the converse of the above. If after deepest expiration the glottis be closed and the chest be now dilated with a great inspiratory effort the heart is powerfully dilated with the elastic traction of the lungs and the attenuated air in these organs acts so as to dilate the cavities of the heart in the direction of the lungs. More blood flows into the right heart, and in proportion as the right auricle and ventricle can overcome the traction outward, the vessels of the lungs become filled with blood and thus partly occupy the lung space. Hence the heart is *distended* with blood. The lungs are congested, the aortic system contains a small amount of blood; the systemic circulation is comparatively empty while the heart and pulmonary vessels

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are engorged with blood. Thus it is during inspiration that the heart par excellence is seen in the role of a suction pump, while systole illustrates the force pump action, aided, perhaps, by expiratory support at intervals. In the convulsive seizures of pertussis we have a most striking example of the combination of the above two experiments and this is my excuse for repeating the minute details. The inspiration which initiates a paroxysm tends to determine the flow of blood from the periphery into the auricles, right and left; it mean while filters through the valves also into the ventricles. The deep character of the inspiration tends to draw more blood than usual into the auricles, especially the right heart is rapidly filled to overflowing with blood, the glottis suddenly is closed and the forcible, short, expiratory movements which accompany the cough occurs. The auricles and ventricles are subjected to enormous pressure, not only from without, but blood is forced from the lungs into the heart and the blood which is already in the right ventricle especially cannot be forced through the continuously and forcibly compressed lungs. The left ventricle keeps discharging its contents, but little blood replenishes the ventricle from the lungs for the circulation in them is suspended or temporarily disturbed. The right auricle and ventricle are enormously distended; the systemic circulation is reduced in tension and the quantity of blood it contains; the pulmonary circuit is supplied at a disadvantage and under great tension. In this condition the heart's action becomes much disturbed, irregular and in some cases the sounds are indistinct and may appear to cease. Suddenly the deep, forcible inspiration occurs, blood flows into the auricles and ventricles again. The right auricle, which has under great stress emptied itself, and the ventricle also now become distended again with blood, but to an enormous degree, for here we have a paroxysmal inspiration. The left auricle, now much emptied through the forced expiratory movements driving the blood into its cavity and thence into the ventricle to be sent to the periphery, is again filled from the lungs; the right ventricle

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is partially relieved after a few contractions and the circulation may restore itself. But if the deep inspiration is followed, as in most cases, by another seizure, the right auricle and ventricle are again seized at the moment of greatest distention and pressed upon from without. The blood in the lungs is forced into the left auricle and thence into the ventricle, to be in turn thrown into the aorta. But with the right ventricle it must force the blood into the very much compressed lungs; it is already overdistended. It contracts at a shorter angle and is thus taken at a great disadvantage; its action is labored and uncertain. The strain is great on the right heart and the left is not supplied with sufficient blood. If we had to deal with one paroxysm the effect on the heart would not be serious, but in some of our cases no less than thirty of these severe paroxysms occur in twenty-four hours. The effect upon the muscle of the heart is exactly similar to that of prolonged contraction upon any muscle—it is strained. The right auricle and ventricle especially are strained, and the work which was formerly performed with ease is now done imperfectly. The residual blood in the ventricle and auricle becomes greater and greater as the paroxysms increase in number and severity. The heart, which is proportionately much larger in children than in adults, is in the position of an enormous muscle unable to perform certain supporting duties; it shows defects much quicker than a smaller structure. The result is that the right heart receives its blood from the periphery, but is unable to correctly send it upon the pulmonary circuit; the small residual quantum being increased the auricle and ventricle on the right side are overdistended and being in a condition of strain cannot contract to greatest advantage, the ultimate result is a venous strain, a change in the mean pressure of the pulmonic circuit. This will be taken up later, we now confine our attention to the heart. I tried to show that the heart was in a condition of persistent overdistention in pertussis. This we can prove by careful percussion. It is a surprising fact that in most of the severe cases, and those even of milder severity,

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the relative cardiac dulness is, in spite of lung distention or even emphysema, what we may designate as large. It is not possible to say in every case that dilatation of the ventricle is present, for in children especially the various conditions of the chest, the state of expansion of the lungs tend to make the percussion areas vary in extent, sometimes in perfectly healthy individuals of the same age. Thus in Steffan's tables of cardiac area of relative dulness the right ventricle at the same age will vary by fully a centimetre in extending to the right of the median line of the sternum. The left ventricle also in perfect health, he has shown, may extend beyond the mammillary line to one centimetre. In my cases of pertussis, while I hesitate to decide, except in certain marked cases, that there was any dilatation of the right ventricle, yet the areas of relative dulness extend in some cases to the right of the medio-sternal line 2.5 to 2.75 to 3 centimetres. Whatever the condition might have proven at autopsy we can say, clinically at least, that the relative dulness was large and easily mapped out. In no case did the apex extend beyond 0.75 of centimetre beyond the mammillary line. The auscultatory signs showed in three cases a slight blowing murmur at the apex and limited to this area. This was systolic, and in the absence of other signs of cardiac disease, I am compelled to attribute the murmur to slight incompetence of a mechanical nature of the mitral valve. DaCosta calls attention to what he calls a functional systolic murmur at the apex, which is not anæmic in people suffering from effects of heart strain. We may say, with a reasonable support from clinical data, that percussion areas of the heart in pertussis show that the heart cavities are in a state of persistent overdistention or relaxation; as it is impossible, I think, to prove dilatation. T. C. Albutt, in his article upon heart strain in the adult, speaks of mitral incompetence, but points out that it is an infrequent sign since the left ventricle is less likely to be overtaxed. I will not take up the objective signs of heart strain here, but subjectively these little patients show the strain upon the heart by

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the desire to keep quiet, to sleep and in some cases, notably one which I will quote later, the children do not care to mount stairs and have to be carried. This without any temperature curve.

*The Pulse.*—The study of the pulse in pertussis tends to strengthen the facts brought out in this paper concerning heart strain and its active presence in these cases. As has been hinted, auscultation of the heart during a paroxysm of whooping-cough reveals irregularity of action; the cardiac irregularity becomes more marked toward the height of the paroxysms until in some cases the heart sounds are not only disturbed in rhythm but quite indistinct so as to become inaudible. In the intervals between paroxysms the pulse of these little sufferers is markedly irregular, more so than we would expect to be normally the case in children. There is a persistent and increased number of beats, and this in the face of the fact that the respirations are not markedly increased. Da Costa found in the adult suffering from heart strain that this condition was present with a feeling of constriction about the chest, though no actual dyspnœa was present. In children it is difficult,if not impossible, to establish such delicate distinctions; but in the cases with accompanying table it will be seen that the pulse rate is higher than the highest average which we are accustomed to expect in the healthy condition, the number of respirations per minute are not very markedly increased, yet they do not reach the normal standard. Therefore, the conclusion to be drawn is that if these children could describe accurately the condition of affairs, we might get a history of a need of deep respiration though no dyspnœa. Watch such a little patient as she or he comes into the room; the individual respiratory movements are deep, the alæ nasæ are dilated, the lips parted. All telling of a disturbance other than physiological.

I show some pulse tracings taken in the intervals and immediately before and after the paroxysms and they also tend to carry out completely the theory of heart strain.

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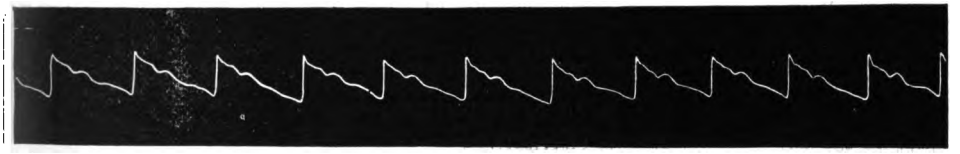
The pulse traces of cases of pertussis, taken in the intervals between the paroxysms, show:

1. Great and marked irregularity in the respiratory line and duration of the cardio-arterial intervals.

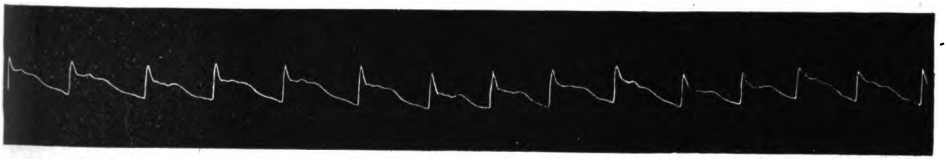
2. Very marked dicrotism.

3. Marked sustained tidal wave.

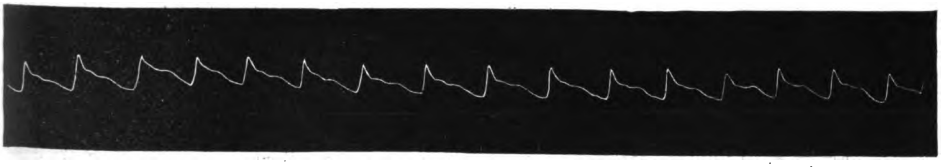
PLATE I —Healthy children, giving curves showing as follows:



1. Healthy chi'd shows dicrotic wave.



2. Dicrotism. Child now healthy, aged ten years. Had pertussis five years ago.



3. Dicrotism. Slight gastritis. Child ten years old.

PLATE II.—Dicrotism and Irregularity. Cases of pertussis.

1. Mild pertussis.

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the desire to keep quiet, to sleep and in some cases, notably one which I will quote later, the children do not care to mount stairs and have to be carried. This without any temperature curve.

*The Pulse.*—The study of the pulse in pertussis tends to strengthen the facts brought out in this paper concerning heart strain and its active presence in these cases. As has been hinted, auscultation of the heart during a paroxysm of whooping-cough reveals irregularity of action; the cardiac irregularity becomes more marked toward the height of the paroxysms until in some cases the heart sounds are not only disturbed in rhythm but quite indistinct so as to become inaudible. In the intervals between paroxysms the pulse of these little sufferers is markedly irregular, more so than we would expect to be normally the case in children. There is a persistent and increased number of beats, and this in the face of the fact that the respirations are not markedly increased. Da Costa found in the adult suffering from heart strain that this condition was present with a feeling of constriction about the chest, though no actual dyspnœa was present. In children it is difficult, if not impossible, to establish such delicate distinctions; but in the cases with accompanying table it will be seen that the pulse rate is higher than the highest average which we are accustomed to expect in the healthy condition, the number of respirations per minute are not very markedly increased, yet they do not reach the normal standard. Therefore, the conclusion to be drawn is that if these children could describe accurately the condition of affairs, we might get a history of need of deep respiration though no dyspnœa. [illegible] such a little patient as she or he comes into the [illegible] individual respiratory movements are deep [illegible] are dilated, the lips parted. All telling [illegible] other than physiological.

I show some pulse tracings [illegible] immediately before and [illegible] tend to carry out co[illegible]

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[redacted]

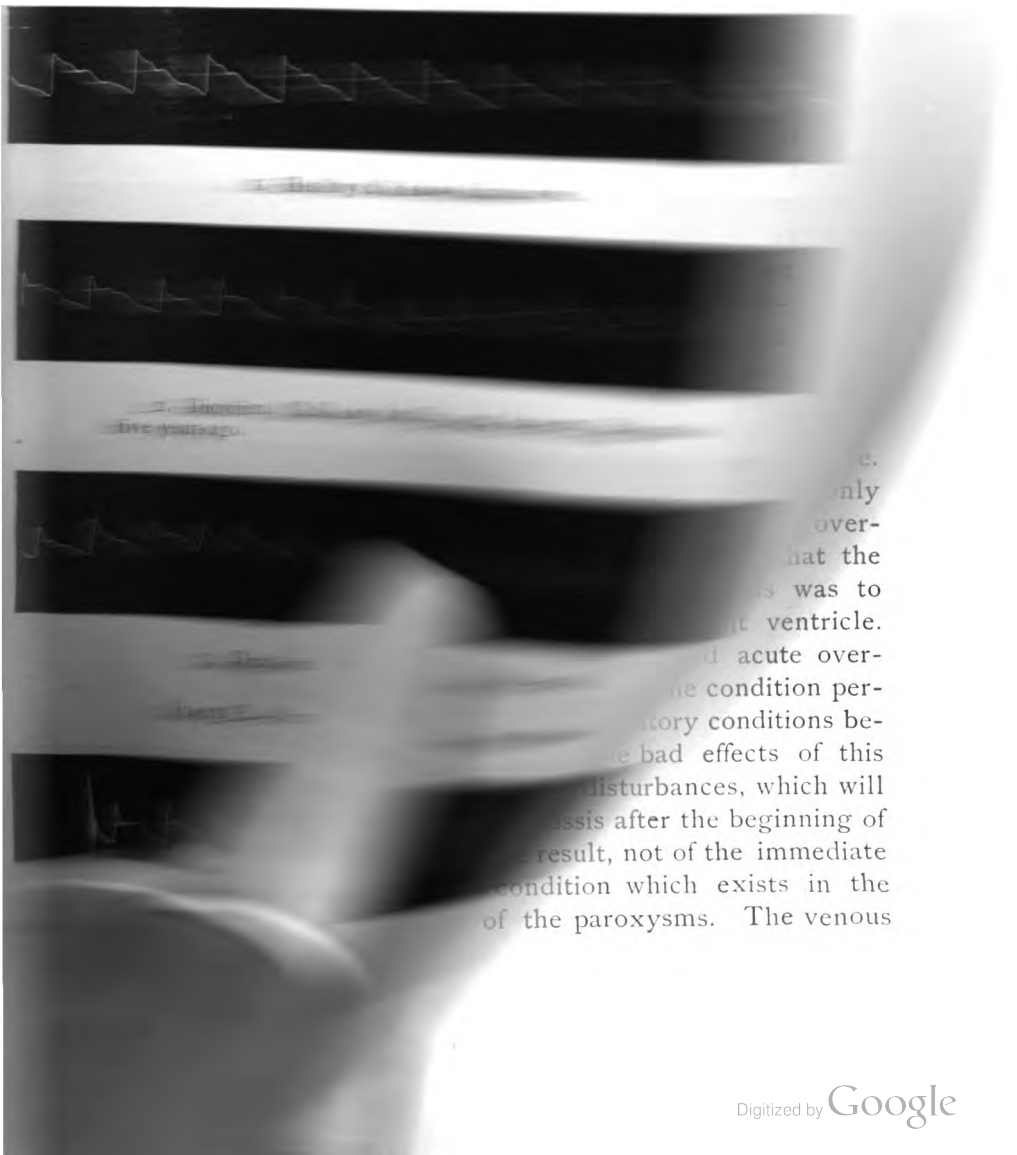
The pulse-traces of cases of [redacted]
between the paroxysms. [redacted]

. Great and marked [redacted]
and duration of the [redacted]

[redacted] very marked [redacted]

Marked sustained [redacted]

[redacted] heavy [redacted]



...ly
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... of the paroxysms. The venous

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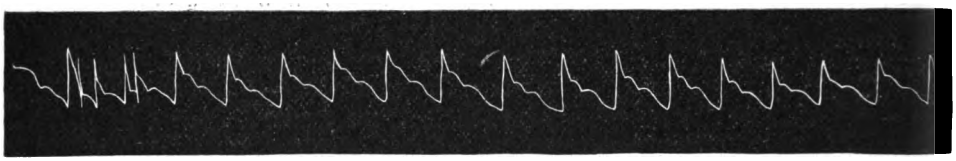
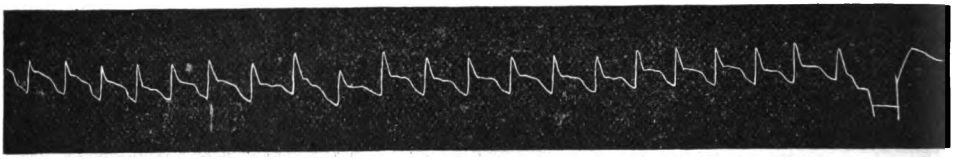
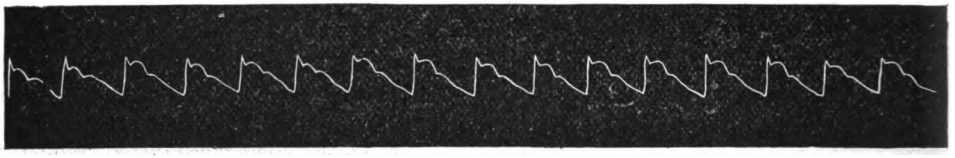


2. Mild pertussis.



3. Severe pertussis.

PLATE III. – Pertussis.

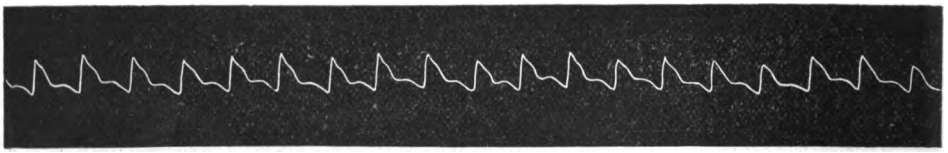


Pertussis. Sustained tidal wave. Five minutes after a paroxysm.

PLATE I. *a*.—Healthy children.

Boy, aged thirteen years; now healthy. Tracing shows irregular respiratory line and cardio-arterial intervals uneven.

PLATE II. *a* —Cardiac disease, showing low arterial tension dicrotism, as compared to dicrotism in pertussis.



Boy, nine years old. Mitral regurgitation; very severe anæmia. Dicrotism marked similar to that of curve in severe pertussis.

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Pulse tracings taken from children in perfect health, show that in these little subjects the dicrotic wave is more marked normally than is the case in the adult subject. We must be prepared to find some dicrotism in all the pulse tracings of children in all conditions. The dicrotism, however, in some cases of pertussis in the interval of the paroxysm is so marked as to closely resemble the dicrotism found in cases of mitral insufficiency, where the insufficience is accompanied by marked lack of compensation of the left ventricle and aortic system contains less blood than it should; its mean tension is much reduced and the surface circulation shows extreme pallor. In the case of pertussis, which I compare to such a case of mitral disease, the dicrotism is very marked. A. B. Meyers has called attention to dicrotism in the adult pulse in heart strain. Burdon Sanderson thinks dicrotism is a sign of venous increased pressure and lessened arterial pressure. I think in these cases it also indicates, if well marked, that as Cohnheim has shown, if through any cause at the heart there is lack of compensatory action the venous passive hyperæmic phenomena are in the ascendency and the aortic mean pressure tension is reduced, the systemic circulation contains less blood. The arteries, therefore, collapse and rebound to a greater degree than is normal, the calibre of the vessel not being completely filled out by the column of blood.

Another interesting phenomena in these cases of pertussis is the sustained tidal wave of Mahommed. The exact significance of this sustained tidal wave it would be difficult to exactly fix upon. Some (Mahommed) seem to think that it indicates a lack of elasticity in the walls of the blood-vessels which delays the lines of descent momentarily. I think that it can also appear when from any cause the resistance in front (capillaries and veins) is increased. This is the case in pertussis. The right ventricle and its auricle being the subject of great continued strain and overdistention do not perform their work completely and within physiological time periods; the result is a venous stasis, first in the lungs and then at various points

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along the circulatory line. The resistance to the arterial current is increased to such a degree in some cases as to bring out in the sphygmographic trace the tidal wave curve more prominently than is normal.

Uncomplicated pertussis, illustrative cases which show relative pulse and respiration frequencies with temperature normal:

| Case. | Age. | Day of Disease. | Pulse. | Respiration. | Paroxysms. |
|---|---|---|---|---|---|
| *A.* | 10 yrs. | 8 | 88 | 30 | 4 |
| | | 10 | 100 | 28 | 9 |
| | | 19 | 112 | 26 | 10 |
| | | 24 | 96 | 20 | 9 |
| | | 28 | 100 | 22 | 8 |
| | | 31 | 72 | 24 | 3 |

Heart dulness 3 c.m. to right median line, apex at mammillary line.

| *B.* | Age. | Day of Disease. | Pulse. | Respiration. | Paroxysms. |
|---|---|---|---|---|---|
| | 1 yr. | 19 | 128 | 48 | 47 |
| | | 22 | 140 | 36 | 45 |
| | | 26 | 140 | 44 | 20 |
| | | 30 | 140 | 36 | 10 |
| | | 33 | 160 | 36 | 17 |

Heart dulness 1.75 c.m. to right median sternal line.

| *C.* | Age. | Day of Disease. | Pulse. | Respiration. | Paroxysms. |
|---|---|---|---|---|---|
| | 16 mos. | 15 | 120 | 30 | 12 |
| | | 17 | 108 | 30 | 11 |
| | | 20 | 120 | 36 | 5 |
| | | 25 | 124 | 36 | — |
| | | 27 | 100 | 28 | — |

Heart 2.75 c.m. to right median sternal line, apex 8 1-2 c.m. to left same line.

| *D.* | Age. | Day of Disease. | Pulse. | Respiration. | Paroxysms. |
|---|---|---|---|---|---|
| | 6 yrs. | 29 | 120 | 32 | 10 |
| | | 31 | 144 | 32 | 12 |
| | | 33 | 128 | 32 | 10 |

Heart 2 c.m. to right median sternal line, nipple line is 1-4 c.m. outside apex.

| *E.* | Age. | Day of Disease, | Pulse. | Respiration. | Paroxysms. |
|---|---|---|---|---|---|
| | 1 yr. | 18 | 120 | 36 | Mother not to be relied upon as to number of paroxysms. They were high however. |
| | | 21 | 120 | 36 | |
| | | 23 | 150 | 48 | |
| | | 25 | 140 | 48 | |
| | | 31 | 130 | 40 | |

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Illustration, uncomplicated pertussis showing pulse, respiration ratios, temperature normal in rectum:

| *F.* | Age. | Day of Disease. | Pulse. | Respiration. | Paroxysms. |
|---|---|---|---|---|---|
| | 4 yrs. | 15 | 154 | 68 | Every few minutes. |
| | | 17 | 152 | 52 | 10 |
| | | 19 | 124 | 64 | 12 |
| | | 21 | 136 | 38 | 12 |
| | | 23 | 136 | 30 | — |
| | | 26 | 132 | 32 | Quite frequent. |
| | | 31 | 124 | 28 | 6 |
| | | 33 | 120 | 36 | 4 |
| | | 35 | 122 | 28 | Frequent. |

NOTE:—Uncomplicated pertussis is meant no convulsions, no pneumonia; a febrile course. It must be remembered that the above cases were under treatment with digitalis and some without during observation. Results shown are influenced by the action of the drugs given to unavoidable degree.

*Venous Passive Congestion; the Smaller Circulation; the Kidneys*—Cohnheim taught that the mean arterial pressure was maintained through the fact that the amount of blood which the left ventricle at every systole throws into the aorta exactly equals the quantity thrown from the arterial system into the capillaries. In speaking of heart disease and the presence of insufficient compensation, this teacher also says that the constant and always recurring results of the heart lesion for the circulation is the lowering of the arterial and the raising of the venous pressure. In pertussis I have tried to demonstrate that not only was the heart badly hampered in its action and overstrained during the convulsive paroxysm, but that the direct result of the recurrence of the paroxysms was to generate a condition of overstrain in the right ventricle. This condition in pertussis might be called acute overstrain of the ventricle. The acuity of the condition precludes the possibility of any compensatory conditions being at once created to counteract the bad effects of this strain. The result is that various disturbances, which will be pointed out to exist in pertussis after the beginning of the convulsive stage, are the result, not of the immediate paroxysm, but rather the condition which exists in the heart in the *intervals* of the paroxysms. The venous

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stasis, as it is called, and fondly pointed out during the paroxysms by most text-books, does not cause the œdema of the face, the pallor, the cyanosis, the general œdema of the surface. For, if the heart were in a sound condition between the paroxysms, a few contractions would soon restore the mean arterial pressure and relieve the venous stasis and increased mean venous pressure. We would, therefore, have very little need of regarding symptoms of venous stasis with apprehension. They would only exist momentarily. But the truth is that the heart being actually compromised as to its forces, we have the results of insufficient compensation, as in mild forms of organic cardiac disease, pointed out by Cohnheim, and this in the intervals of the paroxysms and persisting through the convulsive stage and stage of convalescence of pertussis. In studying pertussis the teachings of Cohnheim upon passive hyperæmia in general are particularly apt. He says that a general rise of venous pressure does not differ in any way from local passive hyperæmia. It matters little whether the obstruction is in the veins which lead from a part or at a greater distance in the heart itself. In patients with insufficient compensation of heart lesions there is pallor, which is not infrequently of a cyanotic hue with anasarca, etc. Thus, in pertussis, the first sign of lack of compensation in restoring the effects of insults upon the right ventricle is the slight œdema about the eyes and face so well known to all of us. It is the first signal which the heart shows of its strained state. In severer cases the venous stasis and œdema is followed by cyanosis of the mucous membranes. Here the pallor of the surface is also noticeable, its diminished temperature (cold and clammy skin). It is in this condition that we mostly obtain the petechial and other hæmorrhages during a paroxysm. For hæmorrhages do not occur when the heart is still strong; it is only when the tired heart absolutely is unable to relieve in part the enormous stasis during the paroxysm that diapedesis and rupture of small vessels occur. In some cases, as a result of the inefficient action of the right ventricle and the venous passive hy-

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peræmia, I have noted dilatation of the smaller vessels in the face, about the cheeks and alæ of the nose. If the heart is at a disadvantage,as pointed out,we would expect that the pulmonary circuit (venous) would be first and markedly affected. I think that the passive congested condition of the lungs is a constant incitant to an increase of the coughing fits. For as soon as we remedy the heart defect by therapeusis, the patients are not only made more comfortable but I have been persuaded that the coughing spells have actually diminished. T. Clifford Albutt calls attention to a case of overstrain in a soldier, who, whenever he returned from parade and loosened the neck fastenings of his uniform and also other accoutrements, was seized with a violent coughing spell. Da Costa calls attention to the so-called nervous cough in cases of heart strain in adults.

*The Kidneys.*—There are only a few authors, Steffan among others, who call attention to the albuminuria of pertussis. Steffan confesses tacitly that the exact significance of the albuminuria he is unable to state. Eichorst also mentions the presence of blood in rare cases. The author of the article upon pertussis in Keating's Encyclopædia of Diseases of Children denies the presence of blood in the urine of these patients. I have studied the urine in cases of mild and severe pertussis. In thirty-six cases of pertussis, examined carefully with this object by me, I have verified the presence of albumen in the urine in eighteen cases. The albumen is not present to a very marked degree. It may be called a trace of albumen. There is, however, no difficulty in finding it even in some cases which are of moderate severity. Blood is also present in a few cases. Eight cases of the thirty-six combined with albumen, and in very rare cases in which the paroxysms are severe and repeated at frequent intervals (ten or twelve times in twenty-four hours) we have a few hyaline casts. The hyaline casts are very infrequent in these rare cases, but yet unmistakably present.

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Urinary table of thirty-six cases:

In ten cases the urine was not examined (either on account of the tender age of the patient or the impossibility of obtaining the urine from the patient). Other, the remaining twenty-six cases, there was

Albumen in 18.

Albumen and blood in 8.

Albumen, blood and hyaline casts 1.

The specific gravity of the urine in some cases, was 1030, also diminished as in illustrative case.

The following case illustrates the presence of albumen, blood and hyaline casts:

*Illustrative Case.*—L. L., boy, aged seven years. Has a father and mother in good health; boy has had no previous illness, as rheumatism, scarlet fever, etc. Three weeks ago he began to cough four to five times in twenty-four hours and a week before consultation the whoop appeared. At the time of paroxysms the boy would vomit. The paroxysms occured night and day. Appetite poor; bowels move once a day; coughs now severer than ever in spite of treatment.

*Status*, Feb. 14, '93.—Fairly well developed; skin sallow, mucous membranes of good color. Eyes œdematous and whole face swollen. Tongue coated slightly, tonsils slightly larger than normal.

Body, 128 c.m. length; chest, 54 c.m.; expansion, 57 c.m.; right half, 27 1-2 c.m.; left half, 26 1-2 c.m.

*Lungs.*—Sonorous râles, with resonant chest.

*Heart.*—Apex in lower part of the fourth interspace, 1-2 c.m. outside mammillaryline. Dulness, 2.5 c.m. to right of the median sternal line at level of the fourth rib. Heart percussion, in view of the distention of the lungs, large.

Feb. 18.—The boy has gradually grown worse, coughs up blood and the paroxysms are very severe as boy has a dusky look to face; he has continued to show signs of bronchitis. But the urine has diminished very markedly, so that only a fraction of an ounce of concentrated urine containing marked amount of albumen is passed at a time. It was not possible to measure it accurately. About 600. c.c.m. were passed after treatment for this diminished; urine was well inaugurated. The number of paroxysms at this time were about ten to twelve in twenty-four hours and very severe.

*Digitalis* begun; improvement marked, but unmistak-

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able, the œdema of the face and general surface became less and less marked, the boy felt more comfortable, the paroxysms slowly diminished and the urine was passed in greater amounts. Discharged (cured) March 16.

*Temperatures* taken morning and evening, and never above 99 2-5 degrees in rectum during whole course of treatment.

Pulse and respiration table:

| Day of Disease. | Pulse. | Respiration. | No. of Paroxysms. |
|---|---|---|---|
| 22 | 100 | 28 | 12 |
| 23 | 103 | 26 | 12 |
| 24 | 88 | 28 | 8 |
| 26 | 104 | 24 | 9 |
| *27 | 104 | 28 | 10 |
| 28 | 96 | 24 | 4 |
| 30 | 96 | 24 | 8 |
| 32 | 100 | 24 | 6 |
| 34 | 90 | 32 | 8 |
| 36 | — | — | 4 |
| 38 | 96 | 24 | 6 |
| 42 | 96 | 24 | 5 |
| 49 | 88 | 20 | 2 |

Urine at first 1029, acid, albumen, blood casts, hyaline and few, acetone; no sugar. Specific gravity ranged from 1020 to 1030 when digitalis, was begun it fell to 1013. Albumen continued, even after digitalis, to a slight extent, the blood persisted a long time but the casts became so few as not to be found. Acetone disappeared after first examination.

The significance which should be placed upon the presence of elements in the urine which signify renal disturbance, seems to me one which may not receive unqualified support, perhaps, from every side. We now suspect or even know that pertussis is an acute infectious disease. The microörganism which has been isolated may or may not prove to be the ætiological factor. Granting that the disease is an acute infectious one, some might attribute the presence of albumen in the urine to the same infectious agencies which act in other diseases, as scarlet fever. I attribute the renal disturbances in pertussis to the active presence in the intervals, especially, of the paroxysms of a venous passive congestion of the kidneys. Traube first pointed out that when either through insufficient compensation or lack of some functional exhaustion of inner-

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vation, as fatty degeneration of the heart muscle or lack of correlation between dilatation and the hypertrophy, there results diminished arterial tension, passive hyperæmia was a natural sequence.

Rosenstein points out that as a natural result of the close relation between pressure conditions and the rapidity of the circulation on one hand and the excretory phenomena in the kidney on the other—the kidneys in lowered arterial tension excrete less urine—it is higher in specific gravity, and albumen and hyaline fibrine cylinders appear. In the above case which I have quoted, the urine became very much diminished in quantity and contained albumen, blood and hyaline cylinders. The hyaline cylinders disappeared, but the blood and albumen persisted long into convalescence. When examined last the cough had entirely disappeared, the boy's parents insisted that he was in perfect health, and yet albumen was found in the urine, though no blood. Albumen may thus persist for a long time after the patient is apparently well. We must conclude at least in this case, which had partly eluded strict treatment, that in convalescence there still existed that condition of strain in the heart muscle which perpetuated to a degree the original condition of venous congestion or hyperæmia in the kidney. It is not the purpose of this paper to trace these cases in their subsequent life, but speculation opens up a vista of possible chronic conditions which may be evolved from neglected cases. I think under the heading of circulatory disturbances I have distinctly shown that there is a lessened arterial tension in pertussis, a marked dicrotism of the wave in the lumen of the vessel; this combined with a certain amount of resistance in front (capillaries), as shown in the sustained tidal wave in some cases, will tend to sustain my theories in regard to the general state of the arterial and consequent condition of the venous circulation. Infectious agents may act also in pertussis aswhere broncho-pneumonia complicates. This is not at all necessary to explain the presence of albuminuria. Heidenhain showed that in the glomerulæ the nutrition

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of the epithelium is changed by the diminished rapidity of the circulation. He estimated it to be one of the chief factors in albuminuria. Following out this theoretical thesis albuminuria has also been caused experimentally. Blood also demonstrates diapedesis in venous passive hyperæmia in the kidney. I must also insist, therefore, upon the presence in pertussis during and after the convulsive stage and in the intervals of the paroxysms of a venous passive hyperæmia in a sense differentiated from any form of morbus Brightii (Cohnheim, Fraube, Rosenstein, Heidenhain). The passive hyperæmia may persist a long time into the convalescent period and even after this, and is due in the main, perhaps wholly, to strain of the right ventricle of the heart.

*Treatment.*—The treatment of pertussis in the convulsive stage has, I think, received enough attention in the literature to justify my omission to review it here. Every general practitioner is well familiar with all the drugs, the methods, the manœuvres which have been practiced to ease the patient's sufferings in this stage. I have in my paper tacitly admitted that much is left to be desired in our present therapeutics of this affection. While I find that antipyrin in liberal dosage is a most useful remedy it certainly is not a specific. These things being thus it must be our aim and perhaps always will be, even though specifics be found to protect the patients from the deleterious effects of paroxysms on the heart and circulation. In the simple use of digitalis, combined with our other remedies (antipyrin), I have found, from a physiological deduction brought forward above, that a very useful and now to me an absolutely necessary drug has been long neglected. No text-book mentions its use in simple pertussis. I think the use of digitalis in any form agreeable, is indicated with the ordinary pertussis remedies as soon as we see the first indications of heart strain. This is the swelling about the face and eyes. The tincture, a mimim for every year up to the second year and then a half mimim additional, as indicated every two or three hours, is a great support to the heart muscle as a tonic,

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the pulse is reduced and is not so compressible as before its use. It is not advisable to give large doses, for the smaller ones frequently repeated have seemed to me to answer the purpose. In the following two cases, which were severe and in which pallor, cyanosis, and all the symptoms of heart strain were present between the paroxysms before its use, the digitalis within twenty-four hours could be traced in its effects. The result in both cases was brilliant. The cases were experimentally deprived of the digitalis until the symptoms of strain were at their height. It was then exhibited with the result, as hinted, that the cyanosis became less, the pallor was not so marked, the children became brighter and continued to improve. The evident fatigue in mounting stairs in the older child became less and less, œdema of the face was reduced to a minimum. When last seen the child from a most severe pertussis, in all the phenomena of heart strain, was guided into a condition in which the paroxysms were reduced so that there was only one in twenty-four hours and the pulse was regular and full and 114 to a minute.

*Pertussis, signs of heart strain*, rapid improvement under combined antipyrin and digitalis treatment.

Celia B., aged 1 year; only child. Easy labor of mother, weighed ten pounds at birth; brought up on sterilized milk. The patient came under observation after having had a cough for two weeks, numerous pertussis paroxysms.

*Status.*—Well nourished child, six teeth, skin is dusky but the mucous membranes of good color, face swollen, signs of bronchitis in chest (sonorous and sibilant râles). Heart-sounds normal. Right ventricle 1 1-2 c.m. to right median line. The number of paroxysms very great (mother says as many as fifty (?) in twenty-four hours). The child having come under observation Feb. 18, '93, and returned to me again March 1, with child very ill. Cyanosed in face, lies sleeping in mother's arms, does not care to play when awake. It was put upon digitalis and antipyrin, the child improved, the symptoms of circulatory disturbance rapidly disappeared and child made a good recovery. Temperature at no time above 98 3-5 degrees in rectum.

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Pulse, 120, 120, 150, 140, 130;
Respiration, 36, 36, —, 48, 40,

before the administration of digitalis.

*Pertussis*, very severe signs of heart strain. Rapid improvement under combined antipyrin and digitalis treatment.

L. W., female child, aged four years; U. S. A.; has had measles three years ago, slight in severity.

Two weeks ago began to cough; cough severe day and night, about as much during the day as during the night; for the past two or three days the cough has been accompanied by a whoop. Vomits when coughs and has about twenty-five paroxysms in twenty-four hours.

*Status*.—Well nourished child. Slight signs of rhachitis. Skin cyanotic around the mouth. Child uses the accessory muscles of respiration quite markedly; skin moist, tongue coated, tonsils large. Face and eyelids œdematous, mucous membranes fair color, pulse very irregular, heart-sounds good. Lungs show subcrepitant and sibilant râles over chest on both sides, in front and behind. Child is *apathetic* and wants to *sleep* most of the time.

Heart in this case at height of paroxysmal stage: *Fourth week*, dulness right ventricle 2.75 c.m. to right of median line. Apex at nipple 6 c.m. removed from the median line. Heart long; diameter 9 c.m.

*Course of disease*.—This patient was allowed to develop the severe symptoms of strain upon simple antipyrin and opium. She was much cyanosed, used the accessory muscles of respiration when walking, refused to mount stairs and had to be carried.

Digitalis combined with antipyrin was ushered in by a very decided improvement. The great œdema of the face and general surface diminished, child became brighter, played, mounted stairs and made an uneventful recovery.

Pulse and respiration ratios during the disease on various days, as follows:

| | Pulse. | Resp. | No. of Paroxysms. |
|---|---|---|---|
| 16th day | 168 | 40 | 11 |
| 17th " | 152 | 52 | 12 |
| 19th " | 170 | 64 | 14 |
| 20th " | 136 | 38 | 16 |
| 23d " | 136 | 30 | 18 |
| 26th " | 132 | 32 | 21 |
| 29th " | 108 | 36 | 24 |
| 31st " | 124 | 28 | 26 |
| 33d " | 120 | 36 | 28 |
| 35th " | 122 | 28 | 30 |

Temperature never above normal in rectum.

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# THE LOCAL TREATMENT OF PERTUSSIS.*

BY J. P. CROZER GRIFFITH, M.D.,

Philadelphia.

WHAT constitutes the best method of treatment of pertussis, whether it should be local, constitutional or climatic, must depend upon the exact nature and mode of production of the disease—a problem which has not yet received an entirely satisfactory solution. Of the various theories which have been advanced to explain its pathogenesis that most widely accepted places pertussis among the infectious disorders. That it may properly be classed here is shown by its contagiousness, its occurrence in epidemics, the existence of a period of incubation and the immunity from second attacks. It is, however, by no means clear how the symptoms of whooping-cough are produced, or where the principal seat of the infection is located. One of the opinions most commonly held is that the terminal filaments of the trigeminal nerve which supply the nose are in a hypersensitive state, and that it is the local irritation of the nasal mucous membrane by the infectious catarrh which brings on the paroxysms. From this point of view treatment should be local and should be directed to the nose. The cure of the infectious catarrh by the killing of the microbes, or in whatever way it is attained, must bring the disease to close. Another and still more widely accepted view is that it is the laryngo-tracheal mucous membrane, and most of all that of the "cough region" on the posterior wall of the larynx, which is in an irritated state. A small quantity of mucous reaching this point irritates the hypersensitive terminal filaments of the superior laryngeal nerve and starts the series of reflex movements which go to make up a paroxysm. From this point of view, too, to cure the disease it is only necessary to stop the catarrhal process by de-

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stroying the germs which are irritating the interarytenoid mucous membrane.

In support of the theory which would make pertussis largely a constitutional infection demanding internal medication, it has been claimed that cough may be brought on by various reflex acts, such as crying, eating and the like, without there being any deposition of mucus upon the cough region. This suggests that the irritation of the laryngeal nerve may be central. The greater frequency of the paroxysms at night indicates the preponderance of the nervous element over the catarrhal, and finally, the occasional existence of pertussis in the newly-born seems to prove that the disease is due to an infectious germ circulating in the blood, and not to any local process.

From the first point of view the finding of germs upon the nasal or laryngeal mucous membrane would indicate that this was their home—the place from which all the damage done by them arises. From the second point of view, the presence of microbes here would be merely, so to speak, an evidence of excretion, and treatment should consequently be directed to the constitutional infection.

As each theory very probably has elements of truth in it, a partial combination of the two may possibly explain the pathogenesis of the disease. It may well be that the germs of the disease are generally, but not invariably or necessarily, at first localized upon the respiratory mucous membrane, from whence they infect, and continue to infect the general system, including the central nervous structures controlling respiration. Treatment may well, then, be either local or constitutional, or both. That each form of treatment often does good has been proven beyond doubt.

As a matter of convenience local treatment may be divided, though quite artificially, into: 1. Insufflation of powders into the nose or larynx. 2. Application of solutions by the brush, or spray, or by irrigation. 3. Inhalation of volatile substances and of gasses.

Even if it were of service it would not be possible in

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any reasonable time to consider all the different measures which have been recommended for local treatment. Only some of the most important can be referred to.

1. *Insufflations of powder into the nose or larynx.*—One of the most popular methods of treatment of pertussis consists of insufflations of quinine. These were first recommended by Letzerich on the ground that the drug is an antiseptic, and would kill the germs of the disease. The formula used by him, and which has been largely employed by others, was as follows:

| | |
|---|---|
| Quinin. hydrochlor. | grm. 0.01 |
| Sod. bicarb. | grm. 0.015 |
| Gumm. arab. | grm. 0.25 |

Insufflations into the larynx were made with this twice a day. Since this treatment was first recommended many physicians have reported favorably upon it. Hagenbach, for instance, has written of it enthusiastically, and of our own number, Forchheimer obtained distinct benefit in all but five of ninety-seven cases.

Laryngeal insufflations are often difficult to employ in young children, and nasal insufflations of quinine have consequently been recommended as a substitute. Very good results have been obtained in this way.

Among the various other remedies which may be employed for nasal or laryngeal insufflations are boric acid, benzoin, iodoform, borate of soda, antipyrine, tannin and resorcin. Michael obtained great success with powdered benzoin blown into the nose once daily. Forty-three out of fifty-five cases were greatly benefited at once. Baginski has used it successfully, and Barthez and Sanné consider it one of the best substances for this form of local therapy.

Boric acid is also a favorite with many physicians. My own experience with it in the form of nasal insufflations, though limited, has been very favorable; the paroxysms appearing to be decidedly lessened in frequency and severity, and this, too, when the treatment was commenced before the *stadium decrementi* had been reached. I have, however, alternated it with antipyrine internally

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in a series of cases in the Children's Hospital, Phila., with the result of showing antipyrine to be superior. I have used aristol by laryngeal insufflation, but not extensively enough to warrant any conclusions.

Various mixtures of powdered drugs have been advocated for nasal insufflation. Guerder employed one of boric acid and powdered coffee in seventeen cases, and obtained immediate improvement in all of them. Moizard used a mixture of benzoin 5 parts, salicylate of bismuth 5 parts, and quinine 1 part; and Bacher one of benzoin 5 parts and quinine 100 parts.

2. *Application of solutions by the brush or spray; by irrigation.*—Many of the drugs used for insufflation may be equally well applied in the form of spray or on brush. In fact, one of the earliest, if not the earliest, means of local treatment of pertussis is that recorded by Watson in 1849, and consisted of the application to the larynx of a weak solution of nitrate of silver. Several observers later reported good results obtained in this way.

The application of a 2 to 15 per cent. solution of cocaine to the pharynx and larynx by the brush or spray, as first used by Pott, has been recommended by Prior, Barbillon, Garnett, Baginsky, Cadet de Gassicourt and others. Henoch, on the other hand, has not had much success with it, and Holt has reported some alarming symptoms produced by it. Although the power of cocaine for good in whooping-cough is sometimes undoubted, the results obtained can be but transitory, and its power for ill is, in my opinion, too great to render its employment desirable.

Among other substances which may be mentioned under this second form of local therapy are morphia, bromide of potash, alum, peroxide of hydrogen, chloride of ammonium, salicylic acid, tannin and resorcin. The latter is particularly recommended by Moncorvo, who claims remarkable results from it. He applies it in two per cent. solution on a brush to the opening of the glottis once a day. Since his publication the value of the drug used in this manner or by insufflation has been proven by numerous physicians.

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Sprays of salicylic acid in 1 per cent. solution have been advised by Neubert. Bleyer uses peroxide of hydrogen, 15 volume strength, 1 part to 5 parts of water, and with this sprays the larynx. He also irrigates the nares with a mixture of 2 parts of peroxide of hydrogen and 3 parts of water. Irrigation of the nares with various substances has been recommended by others also in cases in which there is much nasal catarrh. For this purpose can be used saturated solutions of boric acid; a solution of 1 grain of sulphate of iron to the ounce of water, one of bichloride of mercury to the strength of 1 in 6,000, or one of salicylic acid 1 in 1,000. Irrigation is disagreeable to the child and not without danger from interference with the Eustachian tubes. Insufflation or spraying can probably take the place of this method in most instances.

Tannin in about 1 per cent. solution was particularly recommended by Steffen, who found the disease shortened by it and the intensity of the attacks diminished. Sprays of bromide of potash have the approval of Helmke and of Gerhardt.

3. *Inhalation of volatile substances and of gases.*—The inhalation of the air of the purifying rooms of gas works is a very old plan of treatment, said first to have been recommended by Desmartes in 1859. Although good results were at first reported by a number of observers, Bartholles claimed 219 recoveries out of 341 cases. Later trials have not fulfilled the early promise, and the method has been condemned by most writers. Even inhalations of diluted coal-gas itself have been advised.

The volatilization of carbolic acid is recommended by Buchardt and by many others. After trying various agents, J. Lewis Smith obtained the best results with this, and thinks that its effect in mitigating the paroxysms cannot be doubted. He advises employing it with the croup kettle; three teaspoonfuls of a saturated solution "in enough water to cover the bottom of the croup kettle to the depth of two inches." It may also be volatilized by heating a few crystals upon hot iron, by wet-

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ting sponges or cloths with a strong solution and hanging them about the room, by converting it into a spray with the steam atomizer, or by inhaling it during much of the time from a respirator placed over the mouth, as advised by Pick.

Among other volatile substances which can be administered in some of the various ways mentioned are eucalyptus, turpentine, tar, petroleum, thymol and pumiléne.

Kjellberg has recommended inhalations of benzine and Clar inhalations of camphor. Caillé has given ozone with markedly curative effects. Gazeol, allied to benzine, was tried by Monti and found useless. Cresoline may be vaporized on hot iron, and is reported to be beneficial. A special apparatus for vaporizing it is sold in the shops.

The sublimation of naphthalin has been recommended by Chavernac. Nitrate of amyl has been advocated by Parkinson.

Mohn recommended the fumigation of the room with burning sulphur, and claimed that really surprising effects could be produced in this way. His results have been confirmed by Schonberg, Féréol, Manby and others. Manby states that he has never seen anything like it in an experience of twenty-five years. The child should be removed from the sleeping-room in the morning and dressed in clean clothes. The room should then be fumigated, closed for five hours, and then aired. It is then to be slept in that night. A single fumigation is said to have produced remarkable results.

Compressed air has been used with asserted benefit by Brünniche, Schliep and others.

Inhalations of chloroform and of ether have been recommended for their anæsthetic effects. The treatment is rather general than local. I cannot imagine that it is often, if ever, necessary. The employment of electricity has been advised by Rogsbach. This, too, is rather a general treatment.

Revulsives are only of value as a mode of treatment

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for an attendant bronchitis. The number of remedies of which I have spoken indicates too surely that none of them can be relied on absolutely. In conclusion, and by way of summing up, it may be stated that the methods of local treatment which have the strongest testimony in their favor, and from which probably most can be expected, are inhalations of volatilized carbolic acid, insufflations, either nasal or laryngeal, of quinine, boric acid, benzoin or resorcin, and applications of these substances, and especially of resorcin, in spray or on a brush to the fauces and larynx.

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## THE CONSTITUTIONAL TREATMENT OF PERTUSSIS.

BY F. FORCHHEIMER, M. D.

A CURSORY glance over the literature of whooping-cough reveals the fact that the number of drugs used for treatment is simply enormous; almost every nation has its favorite remedies, one author alone (Barthez and Sanné) mentions sixty-two remedies, so that the short time properly allotted to each of us must, in my case, be utilized by a discussion of the principles of general treatment. Prophylaxis is one of the things, it seems to me, that ought to be taken under advisement. While all of us fully understand the serious nature of pertussis, the enormous mortality, especially among the lower classes, and the mode of preventing the spread of the disease, the laity attaches little importance to whooping-cough, and is correspondingly indifferent to its spread. We see whole nations trembling with fear, not without cause, at the prospect of an invasion from Asiatic cholera, but many diseases which, in the aggregate, kill more human beings than cholera, among them whooping-cough, are altogether disregarded. The rule to be followed is a simple one: As long as a child coughs with whooping-cough it may become a centre of infection. The expectoration is the carrier of the infectious material and this, when inhaled, may give rise to whooping-cough, so that

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every thing that may have come into contact with this expectoration should be disinfected before any other child is exposed to it, best accomplished, to my mind, by exposure to a temperature of boiling water.

The method is perfectly clear and simple, but the question to be asked is: Is it practicable? If we look at the various stages of the disease we shall see that there are many considerations which make it very difficult to carry out prophylaxis with any assurance of success. In the first stage, the diagnosis is practically impossible, and yet, in my experience, the disease is just as contagious then as during the stage of the whoop. It is only during the time of an epidemic that we look upon a coughing child as suspicious and have it isolated. The duration of the second and third stages, both contagious but not equally so, almost precludes the possibility of isolation. A child with the whoop will be shunned by parents, and there will be no difficulty in keeping it out of school. But in the third stage it becomes almost impossible to do so; the poor look upon the school as a place of safe-keeping for their children; it therefore becomes a hardship for them to have the children at home, and with their present views, they will try to evade all sanitary laws, usually with success. Isolation should be more successful in the country, but for cities it is only by the strictest enforcement of the principles laid down that an epidemic can be prevented, and we all know how much we can expect from the practical working of such enforcement. Even if a combination of the conscientious family physician and an efficient health officer (rarissimæ aves, as to whooping-cough) keeps a child from school during the necessary time, after school hours there is a joyous intermingling of healthy and infected, and the work is for nought. Among the better classes of patients isolation is practicable, but with them mortality is comparatively low; among the ignorant poor isolation could only be carried out by removal to a hospital—much to be desired for all contagious and infectious diseases, but hopelessly impossible.

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In order to judge of the value of any treatment for whooping-cough, it may be well to see what is expected.

Trousseau has said that "a method of treatment is of value if cure results in less than six weeks or, in that, at least the frequency and intensity of the attacks are diminished by it."

Heubner (*Jhrbch. fr. Kndrhlknde.*, vi., 1881) judges the action of remedies:

1. By the effect upon the intensity of the attack.
2. Upon the number of attacks.
3. Upon the duration of the disease.

In an article published by me in 1882 (*Am. Journal of Obstetrics*, xv.) I have put down the following requisites for an ideal treatment of pertussis:

1. A positive effect upon the duration of the disease.
2. An effect upon the paroxysms.
3. A prevention of sequelæ and complications.
4. A reduction in mortality.
5. Prophylactic properties.

In order to arrive at anything like approximately scientific results as to the effects of treatment many things are necessary, and this must be accepted as an explanation of the fact that the published results of many authors differ so widely.

Like all infectious diseases, whooping-cough attacks differently at different times, and attacks different individuals differently. It is necessary, then, before judging of the efficacy of a remedy, to have had it tested for many years, and upon a great number of individuals. Nothing is more deplorable than the frequent reports of single cases so often seen in the medical press which have been cured by this or that remedy. In regard to the duration of the disease, we must understand what may be expected from the action of any remedy; the statement of Trousseau has been accepted by many authors, and, possibly, this can be taken as an average, satisfactory result, although many cases are on record in which much better results have been obtained. As to effect upon the paroxysms (number and intensity) state-

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ments must be exact and not expressed in general terms. This is difficult as to intensity of attacks, but can be accomplished. For the number of attacks, Heubner and I were the first to insist that this could only be judged by an accurate report, which, by later writers, has been shown in the form of a chart. Any report upon the efficacy of any drug as to the number of attacks can only be looked upon as the statement of an individual observer with all the innate testimony of fallibility of such a statement and comparatively without value, unless a record of the number of attacks is presented. The third and fourth requisites—prevention of sequelæ and complications and reduction of mortality—go together, as the latter is, practically, coincident with the former. It is extremely difficult to judge a remedy in this direction. The mortality percentages alone vary so enormously as to indicate the difference in the nature of epidemics and the food they are fed with. Again, the caution not to publish too early does not seem out of place. Lastly, the prophylactic powers of a remedy can be readily tested; given a patient with whooping-cough, introduced into a children's hospital, and treated with a certain remedy, if the disease is not communicated to the inmates that remedy can be looked upon as acting as a prophylactic. In describing these various properties of an ideal remedy, I had in mind the action of a specific. Have we any internal remedy that acts as such? There can be no doubt as to the answer. Having no specific, then, how do our internal remedies act? We have remedies that have an effect in all directions, except as to prophylactic properties. Those that seem most universally accepted are belladonna or atropine, and quinia. With both of these remedies the duration of the disease, the number of attacks, their intensity, and to a limited extent, the complications and mortality are reduced. It can be stated, that whatever diminishes the frequency and intensity of attacks must diminish complications and mortality as, in some instances, both are due to the attacks. But is either remedy a specific? No one can

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claim this for belladonna. In regard to the quinia we have the views of Binz and Rossbach, the former claiming for it specific properties—as to the cause of the disease—the latter, reduction of reflex irritability of the cord only. The effects from quinine, whether used locally, internally or hypodermically (*Fervers Jhrbch. f. Kndrhlknde.*, xxviii., 1888) are certainly good. And yet, there are some cases which resist the action of this drug absolutely, so that we are forced to the conclusion that it is not a specific in all cases or that the cause for whooping-cough may be different in different cases. Again, no less an authority than Henoch states that he has never obtained any results from quinia. The same experience can be offered for belladonna—excellent result in several cases, absolute failure in others. Sometimes, in the same family, we will find one case doing excellently on antipyrin or phenacetin, the rest apparently not affected one way or another. These remedies have been chosen principally to illustrate the difficulties besetting us in a proper criticism of the therapeutic effects of drugs in whooping-cough. Some authors have even gone so far as to call to their aid a mathematical formula by means of which the chances of the drug in favor of which they are experimenting may be calculated—all this on a basis of a very small number of cases. If the problem of the efficacy of treatment in whooping-cough is to be solved, it must be done by a great number of observers, having at their disposal a large number of cases and making observations upon lines previously agreed upon. No one observer has a sufficient number of patients under such complete control as to be able to offer data that can be useful, and if observations on such a scale can be made, it is highly important that they should not be confined to one epidemic, nor to one section of a country.

DISCUSSION.

DR. OSLER, speaking of the climatic treatment of pertussis, said if there were any one thing he would not think of doing, it was sending a child with pertussis

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away from home, so that in one sense there was no such thing as climatic treatment; but in another sense, *i. e.*, of fresh air, it is the only satisfactory treatment. Whooping-cough is a specific disease, and he believed with many others, that it ran its course very little influenced by remedies. In his experience he would make an exception in favor of quinine. It would be very interesting for those who had a large number of cases at their command to observe a series of fifty without administering any remedy except a placebo; he would then possess material for a natural history of the disease. Where such a long list of remedies is recommended it is good evidence that we know very little about the treatment of that disease.

DR. HOLT raised the question whether or not children with pertussis were to be sent out of doors or kept in the house, and if out of doors, under what circumstances and how long? He thought it was very evident that they are always better out of doors if the disease were uncomplicated. Again, he was very positive about the very beneficial effects at the seashore, and in certain cases—namely, in those where after the usual month of spasmodic stage, the cough continues for an indefinite period—climatic treatment seemed to be about the only thing to be depended upon. As to the conditions under which the action of our remedies in pertussis should be studied, he said the previous speakers had omitted to insist upon the statement as to the stage of the disease in which the drugs were employed. He had personally made careful experiments with two drugs—belladonna and antipyrine—and he had careful records kept of the number and severity of the paroxysms. There could be no doubt that belladonna reduces both the frequency and severity of the paroxysms. He did not think, however, that any remedy shortened the course of the disease. Four years ago, in the New York Infant Asylum, there was an epidemic of pertussis which lasted nearly two years, and affected many of the youngest and most delicate children. Antipyrine was given a very thorough trial here, the children being observed first for a week without antipyrine or any other medicine, and a record kept of the paroxysms, and the antipyrine was given for a week and then discontinued. In certainly four-fifths of the cases the number of the paroxysms was distinctly reduced by the antipyrine, and the severity also lessened in a large proportion of them. The effect, however, was

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only temporary, for the former severity and frequency returned on withholding the antipyrine. The drug seemed to act more efficiently than phenacetin, antifebrin and similar remedies.

He had found pertussis-pneumonia extremely fatal in institutions. Out of sixty cases which he had observed, fifty had died, and almost every one of these children died in convulsions. In a child under one year old it is a very grave complication, and in an institution-child the prognosis is almost hopeless. In nearly every one of the fatal cases complicated with pneumonia autopsies were held, yet collapse of the lung was very rarely seen. General emphysema was almost uniformly found, together with areas of broncho-pneumonia.

In conclusion, he said that taking a large number of cases antipyrine seemed to him to do more good and less harm than any other single remedy. An infant of six months was given at first six grains a day, then seven grains, then eight grains, carefully watching the effect. He had observed no bad results from it except where pneumonia complicated the condition.

DR. NORTHRUP said that *apropos* of heart-strain in pertussis, he would like to speak of "lung strain." He was surprised at the little stress laid by Dr. Chapin on the emphysema. A child of seven months at the Foundling Asylum died after severe whooping-cough, and at the autopsy the upper and middle lobes of the right lung were found to be torn up into cavities, varying in size from half to two centimetres. The lung looked like brown, thin parchment filled with bubbles, and it was hardly one-tenth of the bulk of the normal lung tissue, and what lung tissue was present was very greatly compressed. Having seen other cases, although not so severe, he felt like trying any approved remedy which might mitigate the attacks.

DR. FRUITNIGHT said he had used most of the remedies recommended for pertussis. During the last eighteen months he had been using bromoform in doses of one or two drops, according to the age, combined with a little spirits to hold it in solution. The record of the number of paroxysms was easily kept by telling the mothers to puncture a card with a pin whenever a paroxysms occurred. Under the bromoform the frequency and severity of the paroxysms diminished, although it was not always successful. Of two children in the same family one took bromoform and the other did not. The

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first one did not improve, while the other child was markedly benefited. Acting upon a hint given him by Dr. George B. Fowler, he had been accustomed to send the poor children with pertussis out on water. When there was no complication, and the weather was good, it was always better to have them out of doors.

DR. WINTERS said that pertussis is almost an absolutely universal disease of childhood; there is no disease which, in its direct and indirect results, is more fatal. It is, through its complications and sequelæ, more fatal than either diphtheria or scarlatina. The opinion of the Society seemed to be that there is no treatment for the relief of this disease. This must have been a thoughtless assertion on the part of those members who upheld it, for surely, if their children were suffering from pertussis they would not be satisfied to have this "let alone" policy applied to them. Mention has been made of change of air and sending the patients out of doors; as to the advisability of this practice much depends upon the season of the year, the constitution of the patient, and the existence or non-existence of complications; hence it follows that skillful discretion is necessary in deciding this question.

The disease is fatal through its complications and sequelæ, and these arise mainly through the frequency and severity of the paroxysms and from imprudent exposure. It is his opinion that the whole course of the disease may be greatly modified and ameliorated by drugs combined with general management.

In the early stage pertussis is located almost entirely at the tracheal bifurcation, and treatment directed to the nose and larynx has no influence, and internal treatment by drugs alone very slightly modifies it; but the general management—counter-irritation, attention to the alimentary canal, fresh air, etc—certainly does modify its course. This must be the conclusion of any one who has carefully and seriously studied this disease. We can diminish the intensity of the irritation at the outset by attention to the digestion, and by counter-irritation, together with the internal administration of drugs. The drug which has proved most useful—and he has tried all known remedies repeatedly in large and small doses, sometimes in almost dangerous doses—is codeia. It diminishes the intensity of the paroxysms and lessens their frequency. He prescribes codeia in sufficient doses to have a decided effect, but at very long intervals. He

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begins by giving it three times in the twenty-four hours, so that the entire effect of the first dose might pass off before the second dose is given. To a child of two years he gives one-twelfth of a grain of codeia once in eight hours. Many deaths said to be due to convulsions, pneumonia, tuberculosis and tubercular meningitis are actually the results of pertussis. It should not, therefore, be said that there is nothing being done to alleviate this disease.

DR. SEIBERT said he had seen a large number of cases of pertussis in the sixteen years of his dispensary and private practice. During the first six years he used carbolic acid internally by spray and by hanging cloths wet with carbolic acid solution in the bed-room. His results were good in infants but not in older children. At the end of this time two of his own children—three and two years old respectively—were seized with pertussis, and the carbolic acid treatment and other methods failed. Their beds were then placed close to the windows, the windows opened and the blinds closed. They were kept well covered, but the wind was allowed to blow in their faces. The first night they coughed but twice, and from that time on they recovered rapidly. Then for the next five years he had treated pertussis children with both carbolic acid and fresh air during the day, the windows being kept open all day, even though it were raining, and fresh air alone at night, one window of the bedroom being left open at least. He had very little difficulty in carrying out this treatment, because the mothers soon found out for themselves that their children were most comfortable when they were in the open air. Some years ago a collective report from most of the German, Austrian, and Swiss clinics on the treatment of pertussis was published in the *Jahrbuch für Kinderheilkunde* in which the observers attributed their best results to large doses of quinine. Since then he had used this treatment, giving a large dose at night or at night and in the morning, and combining this with the fresh air treatment, and he would only say that if he had had such a small mortality in diphtheria as in pertussis he would be very well satisfied. He knew that he could reduce the intensity of the paroxysms with any sedative—morphine, opium, bromoform or bromide of potassium—but quinine had no depressing action like antipyrine. He cited a case in which a woman was suffering from severe pertussis at the time of her confinement. The child was very small and

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delicate, and when it contracted the disease at the age of one week it could not cough, but turned a dark blue, so that he thought at one time it was dead. There was as yet no bronchitis. He gave it three grains of the muriate of quinine morning and evening, and kept the windows open night and day, and hot bottles and clothes around the whole body. It made a splendid recovery. He had been deeply impressed with the efficacy of combining rigid fresh air treatment with quinine, and the reports from the European clinics fully corroborate his own experience. As soon as bronchitis appears he uses hot mustard baths at night, and he thought highly of it.

DR. CAILLÉ said he had long ago given up the routine administration of drugs, and in the management of pertussis insisted upon fresh air day and night, irrigation of the naso-pharynx, and sometimes one dose of antipyrine at night. On his return from Europe in 1887, while waiting for the steamer at Hamburg, he noticed there were three children whooping incessantly. There were many other children on board, and the parents complained and insisted upon isolation of the sick ones, but the captain refused to interfere. The children coughed a good deal the first day, less on the second, and in three days there was no cough even at night. This was a good illustration of the value of fresh air, especially sea air free from dust. Children with pertussis should be taken out, except when it rains, and at night they should sleep in a room which is quite cool. Cold air is not contra-indicated. The speaker repeated his advocacy of nascent ozone in reducing the force and frequency of the cough. He insisted upon nasal irrigation with boracic acid solution to prevent one complication—diphtheria. The common whooping-cough sores frequently become covered with a membranous deposit, and we frequently see pharyngeal, tonsillar and laryngeal diphtheria. The latter were most desperate cases. The pouring of boracic acid solution with a spoon into the nose of a child lying on its back, is a simple and harmless measure. The administration of from three to five grains of antipyrine at night he had found useful, although he could not explain why. He had been perfectly satisfied with this method of treatment.

DR. SMITH said he had been particularly interested in the discussion, because in New York City pertussis was very frequent and fatal. The theory that pertussis is due to a bacillus whose habitat is the upper respiratory tract

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might guide us somewhat in our treatment. His treatment, therefore, had been to make use of antiseptic inhalations, and with good results. He had tried resorcin as recommended by Moncorvo, used in a solution of 10 grains of resorcin to two and a half ounces of water, applied with a brush or spray. It had failed in certain instances. In older children he had used Robinson's inhaler, containing beechwood creasote and terebene with very great relief to the cough. He believed there was no specific. Henoch states that he now depends more upon morphine than on anything else. A sedative, such as codeia and hyoscyamus in moderate doses, he considered beneficial. We know there is no complication impending if the child be well and bright during the intervals of the paroxysms. He thought there could be only one opinion about the efficacy of fresh air.

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## THE COMPLICATIONS OF PERTUSSIS.

BY HENRY DWIGHT CHAPIN, M.D.,

New York.

IT is important to have a clear conception of the complications of pertussis, as they can frequently be avoided by close watching and care during the course of the disease. They may be broadly divided into pulmonary, gastro-intestinal, nervous and constitutional. The pulmonary complications are naturally the most common. Bronchitis extending below the larger tubes and detected by the usual signs may be considered a complication. Pulmonary collapse sometimes ensues in delicate infants and young children. Its mechanism is explained by Sir John Anderson in the fact that if one or more of the tubes become choked up with mucus during expiration, some air is forced out by the side of the mucus, but each respiration draws the phlegm into a narrower part of the tube. Air is expelled, but none is taken in, and, as a consequence, the air-sacs collapse. When the par-

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oxysms of coughing are frequent and prolonged, a marginal emphysema may develop as a complication. Broncho-pneumonia is the most fatal complication. It does not differ pathologically from the ordinary form, but the frequent paroxysms of coughing are apt to cause a constant spread to adjacent alveoli, thus inducing an extensive and prolonged attack. The irritation of the pneumonia itself is very apt to increase the number and severity of the paroxysms, and thus a vicious reaction is induced between these two conditions, each making the other worse. Pneumonia as a complication is especially fatal in tenement-house and institution children. Enlargement of the tracheo-bronchial glands may ensue, especially where there is much bronchitis, but this condition may likewise be seen in prolonged and severe attacks of pertussis, without extensive bronchitis, particularly in strumous children. The repeated attacks of coughing may cause some deformity of the chest, the commonest form being known as "chicken breast." While such deformity is more apt to be seen in rachitic children, it may also occur in non-rachitic subjects from deficient inspirations.

The gastro-intestinal complications may become important, especially in hot weather. The occasional vomiting occurring during the paroxysms of coughing may eventuate in such extreme gastric irritability that proper nutrition cannot be maintained, and dangerous failure of vitality will ensue. Intestinal irritation and indigestion may likewise further complicate the disease. If the mucous membrane of the gastro-intestinal tract shares very long in the generally congested state, a catarrhal inflammation is the consequence. When diarrhœa is added to vomiting, the prognosis may be very grave, particularly in summer. It is extremely difficult to treat such a diarrhœa, which proves intractable to the ordinary remedies. There may be hernia, either umbilical or inguinal, as a result of severe paroxysms of coughing, with much downward abdominal pressure.

The commonest nervous complication is eclampsia.

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The attack is usually during or just after a paroxysm. Any twitching of the muscles of the face or extremities, or forcing of the thumb into the palm of the hand, must be looked upon with alarm, and immediate steps taken to ward off the impending attack. Congestion of the venous sinuses may be caused by frequently repeated paroxysms. In some cases the general congestion becomes so extreme as to eventuate in meningeal apoplexy. I have seen several cases of hemiplegia following pertussis from such a cause. Attacks of laryngismus stridulus may complicate a paroxysm, especially when the patient has a taint of rickets.

Among the constitutional complications may be mentioned the eruptive fevers, but of these measles is far the commonest. The combined effect of pertussis and measles upon the lungs is such that catarrhal pneumonia of a very severe type may be induced. The catarrhal condition of the bronchial tubes in pertussis affords a favorable soil for infection by tubercle bacilli. Tuberculosis as a complication, or rather sequel, of pertussis, must be carefully guarded against. The following case that recently came under my observation at the Demilt Dispensary will serve to emphasize this fact. Rose D., three and a half years. Father and mother healthy. No lung disease in family. One younger child, healthy. The child had practically no illness until she contracted pertussis of average severity. A man living in the same apartment was suffering from phthisis of ten months duration, with very free expectoration. The child's mother washed for this consumptive, who helped look after the former during her attack of pertussis. The history states that they spent much time together. The paroxysms stopped in about two months, but the child kept on coughing and did not thrive. When I examined her several months later, although the lungs were negative, the temperature kept at 101° F. for the few weeks she stayed under observation, and tubercle bacilli were found in the sputum. Extra care must always be taken to guard pertussis cases from this source of infection.

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Scrofulous enlargement of glands may likewise be seen in connection with pertussis. A general depression of vitality may complicate or follow even an average attack of pertussis.

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## CONCERNING THE CARE OF THROATS AND EARS IN CHILDREN.

BY W. P. NORTHRUP, M.D.,

New York.

WHAT are Pediatrists doing for deafness, associated with vault adenoids and enlarged tonsils?

So far as I know this topic has never come before us for discussion. Does this mean that we are not ourselves treating such cases? As sequels of scarlet fever and diphtheria we are the first ones to find them, and upon us rests the responsibility of their care. What shall we do with the stupid, deaf mouth-breathers? Their lives are pathetic. They cannot hear, and are scolded, under the belief that they are careless. They cannot breathe through their natural channels, and because of their gaping mouths, are called stupid. They cannot articulate clearly and when through their dull senses they learn that they are addressed, choke out "wha—at," and are called dunces. Children in school nickname them, parents punish them, the world on the streets regard them as "not right in their heads."

The question is, should not such cases be the special care of the pediatrists? If he be interested in them will not relief come surer and sooner to the patient? Is he not easily competent to take entire care of them?

It is because of a special personal interest in this field of pediatric work that I have brought this subject before you to-day. By making a routine practice of examining

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the ears, throats and noses of all children in my care, I feel sure I have been of occasional service.

A few selected cases will serve to illustrate. They are as follows :

CASE I.—A boy, seven years old, recovered from pharyngeal diphtheria in time to go to the mountains of Vermont for a long summer vacation. His throat was in a promising condition when I last saw him, and I supposed him to be quite safe from further trouble.

Nine months later the boy was brought to me pale, languid, appearing, as the parents expressed it, "not quite bright." He could not hear when spoken to, and constantly said "wha—at," in a dull kind of way. His misfortune brought him many reproofs for inattention and carelessness. His articulation was thick and indistinct, habitually saying *died* for nine. He snored and choked at night, often waking himself and the whole family. He perspired profusely and awoke in the morning tired and feeble.

The pharynx was dusky red, tonsils much enlarged; mucous membrane swollen and crowded into vertical folds, granular, red at the edges. Adenoid growths in the vault, filled the interval from ring to ring of the Eustachian tubes. Ear-drums were beef-red ; no perforations, no discharge.

The indications for treatment were straightforward and carefully met. With a guillotine I cut away the tonsils, and with my index finger scratched away the adenoids of the throat. Thereafter, cleansing sprays—a modified Dobell solution being used in this case—and moderate use of astringents effected an entire relief of symptoms.

The boy soon slept quietly and ceased perspiring ; his voice regained its normal resonance ; hearing became acute ; nutrition was restored, and the boy who was "not quite bright" became merry and mischievous.

CASE II.—This lad was brought by the thankful owner of the case just described. He was fifteen years old. No history of previous illness. He was pale, deaf, a mouth-breather, snored at night, and looked stupid. He was so deaf and so dull that his uncharitable brothers had fastened upon him the name of "slob."

Tonsils were markedly enlarged, touching in the middle line ; general catarrh of nose and pharynx. Mirror

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could not be used on account of the size of the tonsils. These enlarged bodies were the easiest possible to grasp and remove. With the index finger the vault was then explored, and large, soft fungoid masses scratched away. All this was done at one sitting. The boy then went away for a week and no further treatment was prescribed.

It was subsequently reported that he breathed freely through the nose, his hearing was sharp, he slept easily, and, as the report adds, he was able "to hold his own with his brothers" in everything, including "especially eating."

CASE III.—A seven-year-old girl. Her father brought her, having made his own diagnosis and prescribed that the enlarged tonsils should be removed.

The child was frail, nervous, thin, subject much of the time to catarrh. When asked to say twenty-nine, pronounced "tweddy-died." Tonsils were enlarged, and I agreed with the parent that they should be removed. The patient anticipating nothing let me remove the first tonsil (the left) without objection; consequently it was satisfactorily removed. She objected to the second performance, and when at length prevailed upon did not restrain herself quite long enough. When the guillotine had cut from behind forward nearly through the organ the agile patient released her right hand and knocked the instrument clear of her mouth in a flash. The final result was that her left tonsil was in every way satisfactorily removed, and deeply; the right was fairly well removed up to the anterior margin, where a thin lip stood up to the original height of the tonsil, and contained one or two unopened crypts. Believing this could take care of itself, and not caring to worry the child further, I sent her home. Two days later she was in good general condition, and had suffered no great inconvenience in eating, nor was her sleep disturbed by the ordeal of the day. Five days after the operation I was called to see the child with scarlet fever. Here was an opportunity. The pharynx became very red. The left tonsil was dusky, a little raised in its bed, and evidently trying to fulfil the behest of scarlet fever—to swell out—without success. The right tonsil, posterior four-fifths was swollen moderately. The crypts were uncovered and the swelling was unable to meet the traditional demands. In the anterior lip was a display of all the viciousness of the historic symptoms, The teat-like process, straightened out like erectile tissue.

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was dark red, granular, "angry." Here was a most admirable experiment and control side by side in the same mouth.

For two days the throat grew red and redder, the anterior pillar of the right side sharing the deep redness of the nipple-like remnant of the adjacent tonsil. From the first, the nipple was the focus of angry redness and swelling. When the rest of the pharynx was becoming paler and rapidly returning to its normal this monument of a clumsy accident stood red, prominent, granular, angry. About it lingered the surrounding redness of the fauces. For months this erect nipple stood out plainly visible to the inquiring friends, and was accounted the cause of the irritating cough—moderate subsequent catarrh. Summer followed, and by Fall the throat was in good condition throughout.

To me it is clear that this throat unassisted, would have been like so many other past scarlatinal throats, with remaining large tonsils. If, on the other hand, the operation had been wholly satisfactory the patient would have had a much shorter throat lesion, though the doctor would have failed of the most instructive observation.

CASE IV.—A boy, seven and a half years old, was brought to me with a mother's diagnosis of catarrh. Three months previously the boy had scarlet fever, without significant history of throat trouble. He never became robust, though he was able to go to school. The symptoms, gradually growing worse, were as follows: mouth-breathing; deafness; snoring in sleep; sweating so profusely that it was necessary to change his night-clothes several times in one night; appetite poor and capricious; langor; thin, pale and constipated; anæmic. Both tonsils were markedly enlarged; mucous membrane of post-pharynx thickened and thrown into vertical folds, anterior margins of which were red, rough, and slightly ulcerated. On depressing the tongue the slight obstruction of respiration caused the throat to become dusky.

The pharyngeal tonsil was enlarged, lobulated and pressed upon the Eustachian rings. Mucous membrane of the nose was congested, swollen, easily obstructing nasal respiration; ear-drums were beef-red.

The features which distressed the parents were the deafness and night sweats.

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For certain reasons an operation was not urged at once; iron (Pizala's Peptonate) and laxatives (Sprudel Salt) being allowed a trial. Iodide of iron was subsequently tried, with plenty of out-door recreation. Under these he improved somewhat, snoring and sweating continuing. Subsequently, at two sittings, the faucial tonsils and the pharyngeal were satisfactorily removed. In a fortnight his condition was much improved, his sleep was quiet, sweating ceased, appetite and nutrition improved, and soon his hearing was entirely normal.

What lends incidently an added interest to this case is the following history: About two months after the above operation the boy contracted measles, developed double pneumonia, and for days breathed at the rate of 70 and 72 per minute, touching on occasions 80. The slightest obstruction of the respiration, such as mucous in the and coughing, produced cyanosis. It would certainly be safe to say that the presence of two large valve-acting tonsils would have cost him his life, as it was he recovered.

To briefly review:

In three of these cases there was marked deafness.

In all the general nutrition was impaired.

One case, scarlet fever, furnished a two-fold observation—the behaviour of a throat with tonsil remaining, and one with tonsil removed, experiment and control side by side in the same throat.

A fourth shows a case where life was surely saved, humanly speaking, by thorough and timely removal of tonsils and vault adenoids before the onset of measles and double pneumonia.

Finally all the cases show the prompt and gratifying relief of symptoms as result of treatment.

It is not a difficult and not dangerous operation to clip off the top of a tonsil with a guillotine. It is enough to remove the cover of the crypts to cause them to atrophy. The hæmorrhage is not severe, easily checked by syringing the mouth with ice-water. As for the adenoids in the vault of the pharynx, there is a divided opinion among the learned specialists, and until they settle their disputes I shall continue to scratch away the soft growths with

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my finger. Neither of these trifling operations require an anæsthetic or trained assistants.

In conclusion: I believe proper care of the throat requires the (1) removal of all enlarged tonsils where they in any way interfere with the general nutrition, where they perpetuate catarrh of the naso-pharynx, where they in any way cause catarrh of the middle ear.

(2.) That throats recovering from pharyngeal diphtheria and scarlet fever should be kept under observation for some months to ensure thorough recovery.

(3.) I believe that the removal of tonsils and adenoids in children is an operation which pediatrists may satisfactorily perform, and that a systematic care-taking of the throat and ears will render a service which obligation to our cases enjoins upon us.

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# ON THE TREATMENT OF CERTAIN FORMS OF ANÆMIA IN CHILDREN.

BY F. FORCHHEIMER, M.D.,

Cincinnati, Ohio.

IRON therapy has justly been receiving considerable attention in latter years and, as far as experimental evidence is concerned, our modes of administration have been most severely criticized (Kobert). The idea that because Hb. contains iron, therefore iron given internally must increase Hb., undoubtedly is the one that has continued to make iron therapy so universal and so generally accepted. Although iron was used long before Hb. was known to exist, it has been shown that iron s without value in certain forms of anæmia, even in chlorosis, which are accompanied by great diminution in Hb. Furthermore, that, as the quantity of iron in the blood is so very small (3,077 grm. for a man of 70 kilo.—Gorup Besanez—and proportionately much smaller in the child), the question has naturally been frequently seked why we must use so much unformed material to obtain so small a quantity that is formed. On the other hand, anyone who has examined the condition of the blood in patients being treated by iron preparations must admit without hesitation that iron does increase both the

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red corpuscles and the Hb. Even Kobert admits this fact, although he claims that ordinary iron preparations are not taken up into the blood, as is proven, according to him, by the fact that the iron excreted in the urine is not increased. Without entering into a discussion of the merits of the experimental evidence recently offered, but holding to the fact that iron does increase Hb. and red corpuscles, an explanation of this fact is called for. It can be admitted that, under ordinary circumstances, iron must first be converted into an albumin before it can be absorbed and become of service to the blood. Such a combination could be formed as a peptone or otherwise in the stomach or lower down in the intestine. The internal administration of iron peptonate or albuminate will establish the fact that absorption does not seem to take place more rapidly than when an ordinary iron preparation is given and goes to show that the process is not so simple as the mere formation of a peptone. The formation of the Hb. molecule is a very much more complex process, and if we are to use iron for the purpose of increasing Hb. directly, it will have to be given in a form as nearly approaching Hb. itself as possible. We will then be finally put to the alternative of saying that iron, when given internally, does not act directly as iron, but indirectly by increasing the absorption of the Hb. molecule, or that the experimental evidence is faulty and inconclusive. However this may be, it is my purpose to show that in certain forms of anæmia the best results are obtained by a therapy which does not, of necessity, include the administration of iron preparations.

Given a patient with a simple anæmia, *i.e.*, one in which the Hb. percentage about equals the percentage of red corpuscles, if you raise the Hb. you will inevitably raise the number of red corpuscles. This would seem a simple matter, yet I do not find the point made anywhere. Each red corpuscle has the power of binding a variable quantity of Hb., and the variation is quite appreciable; it may even be probable that different red copruscles carry differing quantities of Hb. at the

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same time, but with a given quantity of Hb. only a certain number of red corpuscles can be supplied. If the quantity of Hb. is increased two things may occur: either the already formed red corpuscles may carry this increase or a greater number of red corpuscles may be formed. As a matter of clinical experience both certainly occur. It is not within the province of this paper to discuss the origin of the red corpuscle, but it is certainly a fact that all red corpuscles, at some time during their existence, are cells without Hb.—whether these cells are called erythoblasts, white corpuscles or anything else is indifferent to our purpose. If a sufficiency of Hb. is not present, these intermediate bodies—intermediate in the sense that they exist as between a forming cell and a well-formed red corpuscle—cannot go on in their development to perfect red corpuscles. Therefore it seems of paramount importance to urge the connection between Hb. formation and red corpuscle increase. For two forms of anæmia, chlorosis and anæmia, then, the increase in Hb. seems almost essential to restitution to health.

If we now come to discuss the absolute quantity of Hb. as a physiological datum in children, we meet with some difficulty. This can be best appreciated by constructing a table in which the results of various observers are compared all reduced to Thische's hæmometer.

| Age. | Widowitz. | Leichtenstern. | Hock & Schlesinger. |
|---|---|---|---|
| 4 mos..... | 69% | 94% | 55-60% |
| 3 mos..... | 87% | 88% | 60-80% |
| 9 mos..... | 65% | 77% | 66% |
| 4 yrs..... | 62, 110% | 74% | 65-80% |
| 5 yrs..... ..... | 98% | 76% | 66-68-80% |
| 2 yrs..... ... | 92% | 76% | 95-75% |
| 6-10 yrs.... | 86, 89, 98, 100, 110% | 80% | 68-95% |
| 10-15 yrs..... | 90, 94, 102, 105, 108, 110% | 79% | |

It will be seen from this table that the quantity of Hb. in a healthy child is very variable, but the statements made by Widowitz are still accepted. The one that

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interests us is that in a healthy child the quantity of Hb. must not sink below 60%, and that only repeated examinations will show what the normal quantity of Hb. is in each individual.

Looking at the normal number of red corpuscles it will be seen that 100% is represented by from 4,000,000 to 4,500,000. On account of the variability of the numerator, the fraction commonly used $\left(\frac{\text{Hb. (\%)}}{\text{number of red corpuscles (\%)}}\right)$ would be of little value unless we consider most children oligochromæmic. In order, however, to be on the right side in the review of a great number of cases, I have rejected for my analysis all in which Hb. does not fall below 60%. This naturally brings the number down to a comparatively small one, but sufficient, I think, to demonstrate the point which I intend to make. For various reasons it has seemed preferable to me to consider the relation of the number of red corpuscles to the quantity of Hb. rather than to take the absolute value of Hb. If we were to take the absolute quantity of Hb. in one hundred parts of blood, the cases could be extended, but we are especially interested in the fraction which represents the quantity of Hb. in each corpuscle. The cases have been taken from various authors—Schlesinger and Hock, Monti and Berggrün, Bagïnsky, v. Jacksch, Escherich, Demme, Ortner, Widowitz, a number from the children's clinic at the Medical College of Ohio (the blood being examined by Dr. F. Southgate), from Dr. Rachford and, finally, quite a number from my own records. In all there are 136 cases for examination; of these 71 cases are available. From these are excluded progressive pernicious anæmia, as all analyses since Hayem have shown that the number of red corpuscles sinks, proportionately, lower than the Hb. (According to Widowitz, scarlatina presents the same condition.) Chlorosis is excluded because the condition we are seeking is the essence of the disease. The diseases the patients were suffering from were the recognized forms of anæmia, scarlatina, measles, intermittent, tuberculosis rickets, the hæmorrahgic diathesis, intestinal troubles,

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scurvy, purpura and chorea. In these 71 cases we find in every instance the Hb. reduced much more proportionately than the number of red corpuscles. We can say, then, that when the Hb. sinks below normal, *i.e.*, 60, the red corpuscles do not diminish as rapidly as does the Hb. This is also shown by the examinations made by Widowitz in single cases, where, as in measles, the patient becomes anæmic. This seems to show, then, how important it becomes, from this standpoint alone, to increase the quantity of Hb. in all anæmias, with the exception of progressive pernicious anæmia.

In a paper read before the Association of American Physicians on the "Intestinal Origin of Chlorosis," I have shown that the intestinal tract is the principal place of origin of Hb. Not taking the ætiology of anæmias into consideration, the diminution in Hb. can be due to three causes only—either diminished formation, excessive destruction, or both. As a purely symptomatic method of treatment we can say that if we increase the formation of Hb. one of the prominent conditions of the patient is removed and, possibly, an effect may be produced making the cause of the whole condition inoperative. In every case of diminished Hb. that has come under my observation, it was possible to increase the quantity of Hb. by the internal administration of some intestinal antiseptic. Those which I have used principally are salol, hydro-naphthol creosote and arsenic. In my own opinion iron itself acts partly this way, by preventing the formation of albuminous products not compatible with Hb. formation. The intestinal origin of anæmias is conceded for that worst form, progressive pernicious anæmia, and a case cured by hydro-naphthol has lately been recorded by Gibson. It is also conceded for the anæmias secondary to intestinal troubles, and I hope to have demonstrated it for chlorosis. In these forms, it seems to me, intestinal therapy is absolutely indicated as causal. In Hodgkin's disease, arsenic is the only remedy which seems to offer any hope of success for the present; it matters not whether given internally or

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hypodermically, this remedy acts upon Hb. formation in the intestine, being in all probability excreted by the latter. In those other forms of anæmia, especially leukæmia, in which the cellular elements of the blood are the principal ones involved, it would be difficult to foretell what result intestinal therapy might produce. All the analyses show that Hb. is very much reduced; whether a long-continued increase of Hb. is possible and whether this would have any effect upon the cause of the disease is doubtful, but remains to be shown. Vehsemeyer (Therapeutische Monatshefte 4, 1893) reports a case of leukæmia in a child of nine months of age, in which an apparent cure was effected, as far as the leukæmic symptoms were concerned, by the intestinal administration of creosote and intestinal injections of lysol.

In order to have the best possible therapeutic results, I have found that whatever remedies may be preferred, the administration of one of the drugs mentioned before is necessary. For some time I have used a combination, as follows: before the meal either salol or, when possible, hydro-naphthol, and, after the meal, blood in one form or another. The latter has suggested itself, first, because of the already existing Hb. and, secondly, on account of the researches made in Kobert's laboratory. These so-called antiseptics produce complete utilization of the Hb. forming function of the small intestine and prevent, as well, undue decomposion of the Hb. With this combination the results are sometimes most marvelous, both as to rapidity and intensity. Next in efficacy comes a combination of salol or hydro-naphthol with iron; here the results are sometimes slow, but certainly reliable. In young children, especially in the anæmias of malnutrition, the dietetic factor is a most important one—Hb., naturally, cannot be formed when the precursors are not present in the food; it is especially in these cases that minute doses of blood preparations give excellent results when combined with proper food.

Finally, then, I would present the following conclusions:

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I. In the anæmias of children Hb. suffers greater reduction than the red corpuscles.

II. If Hb. can be increased this will produce an increase in the number of red corpuscles.

III. Hb. having its principal origin in the intestine, can be increased by the internal administration of various remedies having for their action:

*a.* An antiseptic effect, preventing in this manner the destruction of the precursors of Hb.

*b.* A direct supply of Hb. (from blood or blood products).

*c.* To a certain extent, by the internal administration of iron compounds.

DISCUSSION.

DR. CAILLÉ said that this valuable paper showed that we must not treat anæmia from a narrow standpoint. One who supposes that iron is indicated in every simple anæmia, because it is one of the constituents of the red corpuscles, certainly takes a very narrow view of the subject. Anæmia can be improved frequently by the administration of hydrochloric acid, which improves the digestion, and also by increasing the oxidation, as he had shown in his report on the efficacy of ozone in anæmia. Iron frequently fails in these cases because it is given in such large doses that it interferes with digestion and actually aggravates the condition. This is particularly noticeable in children.

DR. GRIFFITH had made some studies on the blood of adults. He believed there was a distinct chlorosis in which the blood corpuscles were normal in number. He had seen a large number of cases in which the number of corpuscles was over four millions, and yet the hæmoglobin percentage was very low. It is very clear that the symptoms of anæmia are due to the deficiency of the hæmoglobin; hence, it is proper to direct our efforts toward securing its increase. He had been, therefore, particularly interested in the author's paper. He never was able to accept the view of Sir Andrew Clarke that anæmia depended on constipation, and certainly chlorosis can be often successfully treated without attending to the constipation. Iron in large doses he had found would often act beneficially when it would not be so in smaller doses, and it may do so by its action in the in-

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testines, possibly by neutralizing some toxine formed there.

DR. KOPLIK thought it was very interesting to see what happens in cases of extreme primary anæmia when no treatment is adopted. They are treated very unsatisfactorily in children, and European observers had come to using arsenic. In one case under his observation the hæmoglobin was reduced to 26%. The blood contained no nucleated red blood cells. Arsenic was prescribed, but the mother was unable to bring the child to the dispensary regularly, although she attended carefully to its diet. The child was observed for two years, and during this time, although no systematic treatment was carried out, the skin changed from its former yellowish-white color to the natural hue of health, the hæmoglobin percentage gradually rose, and after two and a half years, the blood was normal in every respect. He mentioned the case to show how complex was the problem and how little we know about it.

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## A CASE OF ACUTE DIFFUSE SCLERODERMA (SCLEREMA) IN A CHILD OF TWO AND A HALF MONTHS, ASSOCIATED WITH PLEURO-PNEUMONIA AND GENERAL STREPTOCOCCUS-INFECTION; AUTOPSY

BY LEWELLYS F. BARKER, M.D.,

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ALTHOUGH the pathological findings in the comparatively few cases of scleroderma which have come to autopsy have been more or less in accord, yet the whole number of observations has been so small, and the theories based upon these as to the nature of the disease have varied so much, that no opportunity for the study of such cases should be thrown away. The earliest descriptions of the disease have, as a rule, been attributed to Alibert in 1837, and to Thirial in 1845, the former having described the chief features of the disease under the name of "*elfenbeinerner Hautkrebs.*" Since then

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scleroderma has been recognized in different forms and under different names by physicians in nearly all countries.*

There is evidence, however, in the literature that the disease was recognized at a much earlier date than has been usually imagined. In England, according to T. Colcott Cox, Willan, writing on cutaneous diseases as early as 1808, referred to it under the name of "ichthyosis cornea," and spoke of a case which had been observed by Cursio at Naples. Although Silbermann, writing in 1880 (Jahrbuch f. Kinderheilk, Bd. xv.), claimed that only twenty cases had up to that time been reported as having occurred in children, it seems probable from the large number of cases that has since come to light, and from the descriptions of similar affections which can be found in the very early writings, that the disease is by no means so rare as was formerly maintained. The skin disease mentioned by Hippocrates in his *De Epidemiis* as "lepra" was probably not the leprosy that we know, but may have been scleroderma, as was probably also Galen's στέγνωσις. Oribasius (Syropseos, lib. V., cap. XVI. Euparistis, lib. 8, cap. VI.) gives very interesting details concerning affections of the skin associated with hardening and immo-

* The term "Sclerodermie" was introduced by Gintrac in 1847. Max Wolters in his recent admirable review of the subject (Beitrag zur Kenntniss der Sclerodermie, Archiv f. Dermat. u. Syph., XXIV., 1892, 695) has collected the following synonyms for scleroderma:

Scrofule momifiante, Cacimus eburneus (Alibert).
Endurcissement du tissu cellulaire; œdematie concrete (Lionville).
Sclérème en placards; sclérème lardacé (Besnier).
Sclerostemosis cutanea (Forget).
Morphée, Rheumat. Sclerose des Unterhaut Zellgewebes (Eisemann).
Sclérème simple ou non-œdémateux (Gillette).
Sclerema or pachydermatous disease (M'Donnell).
Cutis tensa chronica (Fuchs).
Elephantiasis sclerosa (Rasmussen). Sclerosis corii (Wilson).
Sclerosis telæ cellularis et adiposæ (Wilson).
Trophoneurosis disseminate (Hallopeau).
Cicatrisirendes Hautsclerem (Wernicke).
Scleriasis, Keloid (Addison). Sclérème dès adultes (Thirial).
Textus cellularis durities, Scleroma; Scerema (Chaussier).
Sclerodermia; Scirrhosarca.

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bility, and recommends in the treatment the use of warm baths. Avicenna, Paul of Ægina, and Zacutus Lucitanus (1634) all give descriptions of affections which must, we think, be included among the sclerodermatous processes. Diemerbroeck, writing in the year 1637 (Anat. Corp. Humani., lib. VIII., cap. I., p. 536), refers to the low temperature of the skin and the disturbance of sensibility in patients suffering from this disease. Helvetius, in 1678, describes a case of a woman whose skin was as smooth as marble, and states that the integument was swollen, stiff, and hard, and almost entirely devoid of sensation.

One of the most interesting cases met with in the older literature is that reported by J. And. Usenbezius, which is referred to in the "Embryologia Historica-Medica," of D. Martino Schurigio (Dresden & Leipzig, 1732, p. 211). The case was that of a child born in the hospital at Ulm in 1718, six or eight weeks before term, in whom the disease was so fully developed at birth that the midwife declared that she had delivered the woman, not of a child, but of an icicle. The infant lived twelve hours, and the midwife was only convinced that she had to do with a living being on seeing the child breathe.*

* This reference is of so much interest that we have thought it worth while to give it almost in full. "De fœtu octimestri vivo, frigido et rigido sequentem observationem recenset Johannes Andreas Uzenbezius Ephemerid. Acad. Nat. Cur. *Cent. IX. Obs.* 30, p. 62 seq. Pepererat in nosocomio nostro (Ulmensi) die 7 Octobr. 1718, gregarii cujusdam militis uxor, circa finem octavi ab imprægnatione mensis, partu satis molesto filiam; quamprimum autem obstetrix officio suo graviter fungens eandem susceperat, stiriam quasi se suscepisee statim asseverebat, non solum ratione frigiditatis intensissimæ, sed etiam rigiditatis plane insolitæ et quasi ligneæ ut ne buccis quidem forti quamvis manu fovea notabilis imprimi potuerit, verbo rota corpusculi compages erat ad instar carnis fumo valde exsiccatæ et induratæ, hinc nisi respiratione, eaque admodum levi, vitæ præsentiam prodidisset, vere jamjam demortuam omnes firmiter credidissent. Quo igitur in tenellum hunc, cætera tamen optime formatum, nec mimis ασαρκον fœtum omnis debita et sollicita cura impenderetur, calidis linteaminibus involutus, imo et ad farnacem positus, optime et blandissime fovebatur, attamen uti statua lignea a colore quidem incalescebat, ab eadem vero remutus citius eadem refrigescebat, rigore a capite ad calcem continue perennante, in quo etiam statu per inegrum diem sine ibo et potu, cum maxillæ præ rigiditate diduci nequiverint, permane-

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Perhaps the most careful review of the early literature on the subject is to be found in the article by Andry—or Curzio, in 1752, gave a very good description of a case occurring in a girl of 17, and Haller, as early as 1768, has given results of some post-mortem examinations on similar cases. He was followed by Lorry in 1777, Strambo in 1817, Casanova in 1820, Henke in the same year, Barman in 1825, Pierquin in 1826, and Fontanelle in 1837, all described cases. After this date the literature becomes very voluminous, as one can easily convince himself by referring to the "Index-Catalogue" of the Surgeon-General's Library in Washington. An attempt to review the literature is rendered difficult by the fact that various writers have held very different views as to what is to be included under the term scleroderma. In 1854 Thomas Addison, of Guy's Hospital, London, discussed the earlier descriptions of Alibert and reported a case of genuine scleroderma, to which, however, he unfortunately gave the name of "true keloid," thus obscuring the subject for a long period. Later, Hillier described under "vitiligo" cases which were probably "morphœa," and he then suggested that Addison's "true keloid" resembled Thirial's sclerema. Hilton Fagge, in his thorough work on the subject, overthrew the idea held by Erasmus Wilson that morphœa had some connection with leprosy. Fagge's grouping of the sclerodermatous affections met for the most part with general acceptance, and his work, based on close observation did much toward establishing unity of the diffuse sclerodermatous affections with the different

bat, quo absoluto animulam suam sine sensu et motu, ne ullo vagitu quidem creatori placidissime reddidit."

C. G. Carus, who, by-the-way, describes very accurately and fully sclerema in children, and discusses with much acumen the various theories which had been advanced up to his time to explain the disease, makes the following rather amusing note on this case (Ueber ide Zellgewebsverhärtung neugeborener Kinder, Jour. der practischen Heilkunde (Hufeland), 1816, Bd. 42, p. 110-132): "Es ist dies gewiss übertrieben ausgedrückt, da doch dergleichen 'enfans durs' immer, wie jeder Korper, Empfänglichkeit für äussere Wärme haben, und die Höhle des Uterus eine so sehr verminderte Temperatur wohl nie zeigen kann."

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circumscribed forms, such as Addison's keloid and morphœa.

But even at present observers are not at all agreed as to whether there are several distinct diseases, perhaps closely allied, or if all the varieties are merely modifications of the same disease. The German investigators and many of the French believe that "sclerema neonatorum," "scleriasis," "scleroderma" and "morphœa," are in reality one and the same disease, and that "sclerodactyle" is only a form of scleroderma which is limited to the arms and hands. Clinically the diffused form is, as a rule, easily distinguishable from the circumscribed variety, but there are numerous clinical observations which show that the circumscribed form may in its course become more or less rapidly diffuse. Many object vigorously to a unification of the disease, and separate the sclerema of infants sharply from the scleroderma of adults.

Cruse, writing in 1878 (Ueber Sclerodermie bei Säuglingen, Jahrb. f. Kinderheilk., Bd. XIII., p. 35), believes that he can distinguish true scleroderma occurring in sucklings from the ordinary cases of sclerema of infants in that (1) in the sclerodermatous process the child is, if we exclude the changes in the skin, in a healthy condition; (2) the process manifests an island-like extension; and (3) the growth is firm and circumscribed.

Fœrster and Kaposi separate sclerema neonatorum from scleroderma on anatomical-pathological grounds, while Hennig, in Gerhardt's Handbuch maintains that the two diseases are practically identical, the apparent diversity being explicable by the difference in the normal structure of the tissues at different periods of life. Rogers and LeBreton also believe the two affections to be identical; but Cruse thinks that they have been led into this mistake by the fact that, as he believes, both scleroderma and sclerema occur in children.

The symptoms in all cases of scleroderma adultorum present much in common. With the hardening and immobility of the skin come pigmentation, paræsthesia, rheumatic pains in and about the joints, weakening of the nervous

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and secretory functions of the integument, changes in its resistance to the galvanic current, and in some cases atrophy of the underlying muscles and bones. Cardiac hypertrophy, polyuria, extensive ulcerations, dyspnœa and cyanosis have been noted.

While, however, this scleroderma adultorum is chronic and progressive, the sclerema neonatorum which appears usually within the first few days after birth is more apt to be diffuse and soon terminates, either in death or, in many cases, recovery. Still there are well authenticated cases in which the disease has gone on with a well-marked atrophic stage in which it could not be distinguished from the scleroderma of adults.

The case reported here occurred in the practice of Dr. Ellis, of Elkton, Maryland, who recognized the disease and took pains to secure an autopsy, which was made by Dr. Osler and myself. The clinical history taken from his notes is as follows:

George A. D. was born Nov. 4, 1891. He was at birth an unusually healthy and well-developed child. He grew finely, and although nourished by artificial food, after the first month, had no illness until the beginning of the fatal sickness, Jan. 18, 1892.

He was the third child of his parents, his mother aborting at her fourth month, just before the conception of this child. The first child, large for his age, died very suddenly after a few hours' sickness, the homœopathic doctor certifying the cause of death to be "fat on the heart." The second child, a boy in his third year, is a ipcture of robust health. The parents are well-to-do farmers and the home, itself of fair sanitary surroundings, is located in an especially healthy neighborhood. The family history, with the exception of a taint of insanity on the father's side, is good.

Early on Sunday morning, Jan. 18th, the baby had a shivering fit followed by fever. I saw him at 3 P.M. The temperature was 103.5°F., the respirations 40, and the pulse 120. There was well-marked crepitation over the base of the right lung.

On Monday, the 19th, at the same hour the temperature was 102°, the pulse and respiration being both somewhat less than on Sunday. The physical signs of croupous

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pneumonia were rapidly developing. There was little variation in his symptoms during the week, the temperature especially holding at 102° until Friday, the 23d, when it rose to 104.5°. I was unable to see him on Saturday. On Sunday afternoon, the eighth day of his sickness, the temperature was 98°, respirations 28, and the pulse 112. I took the temperature always per rectum. It was at this time, when separating the buttocks to introduce the instrument, that I first observed the hardness of the flesh. Whether it had begun on Saturday or not I cannot say, but I am certain it had not advanced to an appreciable degree on Friday. The firmness of the flesh was already very marked and unusual. There had been no cough after the fourth day and the nurse called my attention to the fact that the child had difficulty in swallowing. On Monday afternoon the temperature was 99°, respirations 30, pulse 120, surface cool. The firmness of the flesh was now of woody hardness, indeed the whole body was like a block of wood. The knee and elbow joints had very limited movements and the hip joints none. The skin could nowhere be picked up except in a small fold around the neck. In compressing the opposite walls of the chest the epiderm of the front was thrown into numerous narrow folds in the long axis of the body, very like the thin parchment-like epiderm after application of carbolic acid. The power of swallowing was absolutely lost, apparently on account of the great hardness and inflexibility of all the tissues about the neck.

On Sunday the temperature had risen to 102.5°, respirar tions 60, pulse 140. The surface was cool and of a stony hardness. The patient died on Monday morning at ten o'clock, before I could see him.

The only portion of the body not affected by the scle-- ema was the scrotum.

The autopsy was made by Dr. Osler and Dr. Barker.

*Autopsy.*—A well-grown, well-nourished child; eyes open; forehead bedewed with sweat; post-mortem congestion in dependent parts; seborrhœa of scalp; anterior fontanelle open. The skin of chest is covered with a few scales, and here and there the epidermis is lifted and inflated. On the inner surface of the thighs there are lines of linear atrophy, sharply defined and white. To the touch the skin is everywhere board-like, and the child feels stiff and firm as if frozen, and remains rigid when lifted by the legs or arms. The thighs are semi-flexed and cannot be extended, and Dr. Ellis says this was the

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attitude assumed and the condition which existed during life. The general color is of marble whiteness. There is no pitting on the firmest pressure. The skin of the cheeks and lips is involved, but that of the head does not appear to be affected. The skin of the genitals is not hard, but is covered with scales. On section the skin creaks, the cut surface stands out rigidly and the subcutaneous fat looks very white and dense.

The subcutaneous fat was abundant. The lungs were free from adhesions, but the right pleural cavity contained 100 c.c. of thin, greenish-yellow pus. The upper lobe of the left lung collapsed only slightly; along the lower border of the same lobe there was slight consolidation and here and there a small amount of muco-pus could be squeezed from the bronchi. The entire posterior portion of the left lower lobe was reddish and on section showed numerous small areas of consolidation closely united. The anterior border of the lung showed no change and was separated by a tolerably sharp line from the consolidated areas. The cut surface of the consolidated portion was smooth and pale red in color, and pus could be squeezed in abundance from all the bronchi. The blood-vessels appeared normal. The bronchial glands were slightly enlarged, intensely reddened and som-e what softened.

Almost the whole of the right lung was in a condition similar to that described in speaking of the lower lobe of the left. The consolidation was of the same general character and appeared to be lobular, although the whole lung area was affected. Here and there, particularly at the lung margins, a few unaffected lobules could be made out. The entire surface of the lower and middle lobes was covered with a fibrino-purulent exudation. Along the lower edge of the lung was a circumscribed whitish area, slightly elevated above its surroundings, which on section was soft and puriform and apparently breaking down in the centre. This area was triangular in shape, each side of the triangle measuring about 1 c.m. Portions of the lung from areas where the consolidation was most marked sunk in water. Only the lower edge of the right upper lobe was consolidated, although pus could be squeezed from all its bronchi.

The heart was normal in size; the myocardium pale; all the valves normal. In the right ventricle were several globular thrombi; a small thrombus was adherent to the mitral valve by recent fibrin. The right kidney was

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enlarged, measuring 7x4x4 c.m. The capsule stripped off easily; the whole surface was marked with areas of intense congestion and hæmorrhage with irregular borders. These hæmorrhagic areas occupied about three-fourths of the surface of the organ. On section one could see extensive circumscribed hæmorrhages corresponding to those on the surface. There were thrombi in the renal artery on this side, extending up into its smaller branches. Numerous uric acid infarctions were noticed in the pyramids.

The left kidney was slightly enlarged and showed also many uric acid infarctions; otherwise it appeared normal.

The spleen was enlarged, measureing 6x3.5x1 c.m. The organ was reddened and softened. On section the Malpighian bodies were enlarged and easily visible, the trabeculæ being just visible. The liver was large, soft, pale and fatty. Portions of tissue from the various organs were reserved in alcohol, Miller's fluid, Flemming's solution and solution of sublimate for further microscopic examination.

Smear cover-glass preparations, made from the pleural pus at the autopsy and subsequently stained, showed many cocci in pairs and short chains. These cocci were present between the cells as well as in the leucocytes of the exudate. Fresh frozen sections of the lung, liver and kidney made at once, placed on the slide, and dehydrated with absolute alcohol showed, when treated with Weigert's fibrin stain, the presence of many cocci in chains in these organs.

A small quantity of urine obtained from the bladder showed on examination the presence of albumen, red and white corpuscles, together with hyaline and granular casts.

*Anatomical Diagnosis.*—General diffuse scleroderma; acute broncho-pneumonia and purulent bronchitis of both lungs; right-sided empyæma; globular thrombi in heart; infarction of kidney; acute splenic tumor; general streptococcus-infection.

*Cultures.*—From all the organs, the usual precautions being observed, agar Esmarch rolls were made and in each case with a positive result. Colonies of only one kind grew, and these corresponded in every respect to cultures of the streptococcus pyogenes.

*Microscopical examination of the hardened tissues:*

*The Lung.*—The lesions consisted chiefly in a general

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purulent bronchitis and bronchiolitis, together with some broncho-pneumonia and much collapse. The bronchi and bronchioles were filled with leucocytes with polymorphous nuclei, many of which stained feebly. The cubical bronchial epithelium had in many places been cast off into the lumen, and the walls of the air vesicles were swollen and infiltrated with leucocytes. The alveoli which had not collapsed were filled with an exudate which consisted largely of leucocytes with a few epitheloid cells. An occasional large cell was seen in the exudate, containing within it a number of other cells, usually polynuclear leucocytes. The nuclei of some of these enclosed cells stained feebly. The inflamed pleural surface on the right side was covered with an exudate of fibrin and pus, at the base of which was a layer of granulation tissue with new blood-vessels in process of formation.

*The Kidneys.*—The most striking point was the extensive hæmorrhagic infarction of the right kidney. Nearly the whole tissue was infiltrated with blood. The outlines of the cells were fairly well preserved but the nuclei stained feebly, and in places little aggregations of leucocytes could be seen. Specimens stained with the fibrin stain showed, besides the vessels filled with thrombi, numerous chains of streptococci in the interstitial tissue, and many coarse globular droplets of hyaline stained a delicate violet, especially in the epithelial cells of the convoluted tubules. Several of the tubules contained casts, the upper portions of which stained very much like the masses of hyaline in the cells. In the tubules of the cortical portion of the kidney were numerous collections of globular bodies which stained deeply in hæmatoxylin. Sometimes the central portion of a globule had taken the stain much more intensely than the rest. These bodies stained well also in methylene blue. Glacial acetic acid slowly but gradually dissolved their substance, but a solution of potassium hydrate, alcohol, ether and essential oils had no effect. The left kidney was free from infarction and hæmorrhages, but in other respects resembled the right.

*The Spleen.*—In this organ many small hæmorrhages could be made out, and in these hæmorrhagic foci there had been considerable nuclear fragmentation. The large cells containing red blood-corpuscles and masses of hæmoglobin were plentiful in the splenic pulp.

*The Liver.*—This organ was extremely fatty. Sections

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stained in eosin and methylene blue showed numerous groups of cells scattered throughout the organ, which stained brightly in the eosin, had well-defined margins, were more refractive than usual, and whose nuclei took on no stain. These groups contained, as a rule, from eight to thirty necrotic cells each, but here and there a necrosis of single cells could be made out. In the larger areas leucocytes with polymorphous nuclei were present, as well as a few cells with brightly staining spindle-shaped nuclei. These areas bore no distinct relation to the liver lobules and they corresponded in appearance with those seen in other infectious diseases.

*The Thymus Gland.*—Here also there were numerous areas of necrosis with marked nuclear fragmentation. The necrosis seemed to occur most frequently in association with the concentric epithelial bodies (Hassall's corpuscles), and is quite analogous to the necroses seen in lymph glands.

*The Skin.*—The changes appear to be identical in different parts of the body and the description here given is based on the study of sections from the abdominal and thoracic walls and from the inner side of the thigh.

In the epidermis no very marked change could be made out. The cells of the lowest row of the rete Malpighii appeared somewhat flattened. Many of the cells of this layer were vacuolated, the nuclei being pushed to the periphery of the cell, so that they often assumed a crescentic shape. The connective tissue papillæ of the corium seemed more flattened than normal and the epithelial down-growths between them were correspondingly shallow. The bundles of connective tissue fibres of the corium in the "pars reticularis" were swollen and thickened. The meshes between them were not so wide as normal, nor were there so many nuclei of fixed connective tissue cells as usual. The vessels presented no alteration which could not, we think, be explained by the change found in the connective tissues in which they were imbedded. It is possible that the appearance of the middle coat was somewhat denser than normal, so that some structures, *e. g.*, the elastic layer which at times can be readily seen, were not to be made out. But the principle change was in the adventitia and surrounding connective tissue, and this consisted not in an increase of the number of fibres, but in a swelling and thickening of those normally present. In some of the nerve bundles there was an apparent increase in the con-

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nective tissue within the nerve itself. This is, we believe, due to a swelling of the connective tissue fibres normally present in view of the fact that no increase of the tissue cells of the epinarium was demonstrable. The sebaceous and sudoriparous glands and the hair follicles were not apparently altered. The erector pili muscles running up to the hair follicles were broad and thick, but such an appearance is not infrequently met with even in health. Occasionally a gland duct was found dilated, as though there had been some obstruction to the out-flow of the secretion.

The changes in the subcutaneous tissue were perhaps as interesting as any. While the amount of adipose tissue was not diminished to any marked extent the bands of white fibrous tissue, which run down through the tela subcutanea, connecting the corium with the fasciæ, were thickened. The supporting connective tissue framework of the fat, usually so delicate, was in parts thickened in the thickened portions, although there did not appear to be many more nuclei than normal. The thickened trabeculæ did not show perhaps quite so much swelling of the individual fibres as did the fibrous tissue of the corium. The analogy between this condition and that which is seen normally in those parts of the skin which are only slightly movable, as has already been pointed out, becomes at once evident. For, as has long been known, that skin lying immediately over the periosteum and that covering the palmar surface of the hands (especially the ends of the fingers) and feet owes its comparative immobility to thick fibrous bands, the *tenaculæ cutis*, which connect the corium with the subjacent periosteum or fascia.

While the literature referring to the clinical characteristics of scleroderma and sclerema is extensive, that dealing with their pathology is comparatively limited; Paulicki, writing in Virchow's Archiv, Bd. 43, in 1866, could find references to only five autopsy records up to that date. Lindstrem, writing last year, has collected some forty references to the pathological anatomy of scleroderma. Nearly all observers have confined their studies to the tissues in the scleroderma of adults. The thickening of the fibrous tissue and encroachment

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upon the fat was noted by the early observers, Förster, Köhler and Ausspitz. Köhler in 1862 had noticed the diminution in the amount of yellow elastic tissue. Chiari described a proliferation of small round cells in the corium and a thickening of the connective tissue. Rasmussen was one of the first to draw attention to the changes in the blood-vessels and particularly to the proliferation of the cells in the adventitia in the small arteries of the skin. Neumann and Georgiewski noted similar lesions. Crocker, in circumscribed scleroderma, found thrombosis of the smaller arteries.

Langer (Wiener Akad. Sitzungsbericht, 1881,) believes that sclerema neonatorum is due to the lowering of the body temperature in conditions of collapse, bringing on solidification of the fat. The fat in children has a melting point of 45°C., as it contains more palmitic and stearic acids and less oleic than the fat of adults, which at room temperature divides into two layers, one fluid, which congeals at 0°C., the other granular, which becomes fluid at 36°C.

The ætiology of the affection is still obscure. No constant set of conditions can be said to exist for all cases. Trauma, cold, acute infection; *e. g.*, erysipelas, malaria, pneumonia; constitutional anomalies (anæmia and scrofula), psychical affections have all been mentioned, as predisposing or exciting causes. There is a good deal of evidence in favor of the view that cold may be at least an important exciting factor. Cases described by Anderson, Nocolich, Dinkler, and others make this seem very probable. Rasmussen and Koebner have found the disease associated with erysipelas. Hoppe Seyler (Deut. Archiv. f. Klin Med., 1889) described two cases in connection with joint rheumatism, occurring in the same place and under the same conditions, and advanced the hypothesis that the disease might be due to a specific microörganism, a view which has little to support it. The individuals most frequently attacked are those who have suffered some general depreciation of the vital forces.

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The views held as to the essential nature of the affection are very divergent and are nearly all based upon the study of chronic cases in adults. The hypothesis of Hortelloup that scleroderma depended upon the permanent contraction of the smooth muscle fibres of the skin, and the view of Heller, who thought that the changes in the skin depended upon occlusion of the thoracic duct with subsequent lymph stasis, have now no followers. The majority of clinicians incline at present to a neuropathic theory, which indeed has much to support it, especially the view which makes the disease depend upon a trophoneurosis. The peculiar distribution of the lesions, which are either symmetrical or take in one half of the body, the initial vaso-motor disturbance, the frequent development along definite nerve paths, the combination with muscular atrophy, hemiatrophia facialis and other tissue atrophies have been urged in support of this theory, but after all to say that the disease is due to a tropho-neurosis in which there are no demonstrable microscopical changes in the nervous system is little more than acknowledging our ignorance of its nature.

The inflammatory theory, based upon pathological examinations of chronic cases and supported by LaGrange, Chiari, Rindfleisch, Förster, Birch-Hirschfeld and others, explains many of the phenomena, but cannot be regarded as being wholly satisfactory. Vidal was the first to demonstrate changes in the vessels. Dinkler, in Erb's clinic last year in a careful article (Zur Lehre von der Sklerodermie, Deut. Archiv. f. Klin. Med., Bd. xlviii., p. 514), lays special stress on the vascular lesions (peri-, mes- or endarteritis fibrosa), and even goes so far as to advance the hypothesis that scleroderma is essentially a disease of the cutaneous vessels. He thinks he can make out in the very earliest stages of the affection, in portions of the skin removed *intra vitam*, changes in the small arteries which he considers to be the seat of the first lesion. He cites the argument of Pfeifer (who combats the view that herpes zoster is of nervous origin) that Masschot has shown that the arterial distribution in the skin is similar to the

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nervous distribution. Pfeifer (Ueber einem Fall von herdweiser Atrophie des subcutanem Fettgewebes, Deut. Arch. f. Kl. Med., Bd. 50) has recently described a case in which there were nodules of atrophy in isolated areas in the subcutaneous fatty tissue, associated with thickening of the fibrous tissue and vascular changes. He believes that the muscular changes which have been regarded as secondary to the alterations in the skin, may in some instances be primary and lead to a secondary sclerodermatous change. He believes, too, that scleroderma can begin in the subcutaneous fatty tissue, and thinks that his observations prove that the initial lesion is certainly inflammatory. Foulerton (Lancet, London, 1892, ii., 1094) records a very interesting case in a girl of twenty-two months, in which there was diffuse scleroderma, the process being most marked in the right thigh. After a year there was considerable shrinking, and in two years the right thigh was much diminished in size, and was hard, cold and waxy to the touch. Gangrene appeared in areas on the dorsum of the foot and over the internal condyle of the femur. Later there was marked sloughing. The limb was amputated; the vessels were found to be of very small calibre*, the tissue almost bloodless and there was marked atrophy of the muscles of the leg. Foulerton regards the affection as a disease "widely affecting a widely spread and genetically allied group of tissues of mesoblastic origin, including subcutaneous areolar tissue, fasciæ and the fibrous capsules of joints."

We have said enough to make it evident that much has yet to be done before our knowledge of sclerema and scleroderma can be regarded as definite and satisfactory. It is clear from the examination of the tissues of this child that the changes in this diffuse acute sclerema are, along with some change in the fat itself, those of a peculiar metamorphosis of the connective tissue fibres already present, rather than such as would follow upon

* "Remarks on Sclerema and Œdema Neonatorum," *British Med. Journal*, 1890, 1, p. 403.

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inflammation or hyperplasia. Of the chronic scleroder-matous processes there are on the other hand sufficient cases, which have been carefully studied, to prove that atrophy of fatty tissue with actual increase of connective tissue in the different layers of the skin are the main changes.

Now, are these processes wholly distinct or do they possess sufficient in common to justify us in classing them as different forms or stages of essentially the same disease? Before discussing this point one word must be said as to the differentiation of sclerema from œdema in young children, a point which Ballantyne in particular emphasizes. Much confusion has arisen here, although the processes are easily distinguishable. In œdema the skin is soft and boggy; it can be pinched up into folds and pits easily on pressure; in sclerema on the contrary the skin is firm, cannot be easily moved or pinched up into folds, and does not pit on pressure. Moreover, at autopsy serous fluid exudes from the dropsical skin of an œdematous subject.

But we are not convinced that œdema and sclerema bear no relation to one another. Indeed, there is not a little evidence to show that sclerema in many instances at least is associated with, or is consecutive to œdema. There are numerous instances in which, in the course of a general œdema, the skin and subcutaneous tissues have suddenly or gradually become hard and tense, presenting all the phenomena characteristic of sclerema. There are cases reported, too, in which, while parts of the skin were scleremátous, others again were typically œdematous. Our knowledge at the present time is not sufficient to permit us to state definitely that changes of a degenerate character occur at first in the cases of acute sclero-derme, even in those instances in which a chronic process follows on the acute disease. That the tissue changes vary in their intensity, however, is shown by the different types and by the fact that while in some cases the morbid condition of the skin may under suitable treatment wholly disappear, in others, in spite of all

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therapeutic efforts, death occurs or a chronic indurative process ensues. There are at least several cases in which, in young children, a disease beginning as an acute diffuse sclerema has continued and passed into a chronic sclerodermatous process quite like the scleroderma of adults.

Now, in adults, while the usual form of scleroderma is circumscribed and chronic, yet cases in which the process was diffuse have been reported in the literature. Recovery in adults is rare and the degenerative and sclerotic processes are usually progressive. Besides, it is a significant fact, that in adults scleroderma is often associated with diseases which are accompanied by œdema; *e. g.*, chronic nephritis (Osler), and the question naturally comes up whether in the scleroderma of adults the first stage in which swelling precedes the thickening, the earliest change may not be a metamorphosis of the connective tissues similar to that which we have described in acute diffuse sclerema. The clinical histories of these cases of scleroderma in adults show, it will be remembered, first swelling, then thickening and finally atrophy and thinning of the cutaneous tissues. It would be interesting, indeed, if this "cirrhosis of the skin" should, like the cirrhoses of the liver, lungs and kidneys, turn out to be a primary degenerative change followed by secondary hyperplastic changes in the connective tissue. Should this prove to be the case, might not the arterial changes, which at the present time are being so much insisted upon, have to be regarded as secondary rather than primary. It seems to us, therefore, quite justifiable from the analogies which we have pointed out to group the cases of sclerema of infants, if not together with, a least close to those of scleroderma in adults.

The question can be cleared up only by the controlling of systematic clinical examinations in patients of all ages, by the making of thorough histological investigations of tissues in all stages of the disease.

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DISCUSSION.

DR. NORTHRUP said that in the first volume of the Transactions of the Society (ARCHIVES OF PEDIATRICS, Vol. vii., p. 1,) would be found the report of a typical case of sclerema neonatorum which he had read before a session. It was of the exact type described by French and German observers, and after a search through the library of the Surgeon-General, he concluded it was the first typical case of sclerema ever presented in American literature. The child, the weaker of twins, lived to the ninth day. There was the characteristic œdema going on to induration, and the temperature fell to 96°, and probably lower, but he had no thermometer at hand which would register below this point. The child was known at the asylum as "the stone baby," or "the cold baby," and was the only case of the kind which had occurred in this institution. He made careful sections from the abdomen, thigh, sole of the foot, and one or two other places and preserved them in three different ways. Control experiments were made with corresponding sections obtained from children of the same age, at autopsies made immediately after death. These were also hardened according to three different methods, and stained in many ways, and were then studied with regard to the blood-vessels, fibrous bands, and the structure of the subcutaneous tissue, and the corium. After a multitude of sections had been made, and studied by him, they were presented to dermatologists, general pathologists and others, yet no one was able to point out anything characteristic, morphologically, in the case. Owing to slight variations in the individual sections, some of the observers picked out normal specimens for abnormal ones, and in one such instance, an observer was sure the connective bands were thickened. The case was studied with great care in the light of all previous investigations, and yet nothing characteristic could be determined. He did not think the connective tissue bands would explain the phenomena observed in that case, and under the circumstances, he thought it would be much better to take the ground that there has been no satisfactory explanation offered thus far.

DR. JACOBI said that the fact that the temperature in Dr. Osler's case was not so low as in the few cases of sclerema neonatorum he had seen, and in those reported by others, was because there was a pneumonia at the same time. One case, reported in the paper as a sclerema

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localized in the thigh, was really a scleroderma, and was not very conclusive as proving the identity of the two forms. He would say it was not sclerema but a scleroderma from the beginning, and he made this distinction because he had not been able in his own mind to establish their identity.

The scleroderma of adults and of children of five or six years, seen by him and as described in the books, he had always looked upon as a neurosis. It occurs in streaks, which are, it is true, often (but not always) bilateral, and it affects only a part of an extremity, following the course of the nerves; it is undoubtedly the result of a neuritis or of central disease. Seven or eight years ago a man came to him with a slightly swollen and slightly discolored brownish spot on his right leg, about four inches above the external malleolus It was not painful, but there was a certain amount of paræsthesia and a numbness for several inches around. He told him it had existed for several months. He believed at that time that the man staggered slightly when his eyes were closed, and he looked upon the scleroderma as rather the result of spinal cord disease than as local neuritis. After long treatment his spinal cord condition improved, and the scleroderma disappeared, but quite recently, he returned with decided ataxic symptoms and a slight return of the paræsthesia. This case proved to his mind that scleroderma is decidedly a neurosis. Sclerema is mostly seen in newly born. The hardness of the tissues is as a rule bilateral, and, therefore, there should be a constitutional cause for it. If we assume for a moment that the œdema is no longer an œdema but an effusion of abnormal blood, the problem would be solved. We had not yet learned to return to the standpoint of the humoral pathologists. For instance, if we would assume that there was more coagulable material in the blood, coagulation would occur as soon as the exudate is formed, and the problem would be solved.

He believed that this theory had been propounded by the older writers. For these reasons, in future cases, the composition of the blood should be most carefully studied. By others, the condition of the fat of the newly born, differing from that of adults, had been charged with giving rise to the greater firmness of the swelled parts.

DR. KOPLIK said that most of the cases he had seen were at the Foundling Asylum at Prague and among the

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newly-born. In this clinic, the affection was first noticed about the inside of the thighs, then on the buttocks, and the cheeks were usually next involved. It should be differentiated from the œdema or puffiness seen on the hands and feet in children suffering from any exhausting diseases.

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## ÆTIOLOGY OF INCONTINENCE OF URINE IN CHILDREN.

BY B. K. RACHFORD, M.D.,
Newport, Ky.,

Clinician to Children's Clinic, Medical College of Ohio.

IT is my belief that incontinence of urine in children is a true neurosis, and not as a rule due to muscular incompetency of the sphincter vesicæ. It is rather a symptom than a disease, and is usually associated with other nervous symptoms, with anæmia and with reflex irritation.

This condition, like the other neuroses of childhood, rests upon a tripod of ætiological factors, viz.: (1) Irritable and unstable nerve centres. (2) Anæmia with consequent malnutrition. (3) Reflex stimulation of certain nerve centres in the lumbar cord.

In recent papers† I have discussed at length the relative importance of these factors in the production of chorea and the other neuroses of childhood.

In the majority of cases of incontinence of urine these three factors coexist, but they do not coexist in all cases. For example, we may have incontinence without anæmia, and anæmia without incontinence. We may also have incontinence without apparent reflex irritation, and reflex irritation without incontinence. It is not sufficient, therefore, to say that adherent prepuce, vesical

† "Ætiology of Chorea," *Philadelphia Medical News*—April 22, 1893, and "Tuberculous Neuroses of Childhood," ARCHIVES OF PEDIATRICS, May, 1893.

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irritation or some other reflex cause is the cause of incontinence of urine; neither is it sufficient to say that anæmia with general malnutrition is the cause of this condition; nor can we say that a neurotic inheritance is as a rule sufficient to produce incontinence, since the great majority of nervous children do not suffer from this condition. A rational inquiry, therefore, into the ætiology of this condition must consider not only how each of this tripod of factors may act in producing incontinence of urine, but it must also inquire into the interdependence and relationship of these factors. Such an inquiry is the purpose of this paper.

That one may understand the importance and relationship of the above-named factors in producing incontinence, it will be necessary to keep in mind the mechanism of micturition. One must remember that the longitudinal and circular muscular fibres of the bladder, which by their contraction empty the bladder, are enervated by sensory and motor nerves from the lumbar region of the cord, and that the external sphincter in the prostatic portion of the urethra, which by its contraction prevents the escape of urine from the bladder, is also enervated by sensory and motor nerves from the lumbar cord. Dr. Von Zeissl's* recent researches on the innervation of the bladder gives us a better understanding of this subject. He found that "the erector nerve" was not only the motor nerve of the muscular coat of the bladder, but that it was the inhibitory nerve of the sphincter vesicæ, and that "the hypogastric nerves" carry motor fibres to the sphincter vesicæ and inhibitory fibres to the muscular coat of the bladder itself. These researches of Von Zeissl make plain the manner in which reflex causes may act in starting or checking the flow of the urine. For example, a reflex carried to the proper centre in the lumbar cord, would, through the motor fibres of the erector nerve, contract the muscular coat of the bladder and through the inhibitory fibres of the same nerve relax the sphincter vesicæ, and in this manner

* Ann. d. Mal. d'Org. Genito-Urin., November, 1892.

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allow the urine which is being expelled by the contracting bladder to pass without hindrance through the relaxed sphincter vesicæ. This is indeed a simple and beautiful nervous mechanism that must be understood if we would understand the ætiology of incontinence of urine. But another important fact must also be remembered in this connection, and that is that the act of urination is in part under the control of the will. We will to urinate or not to urinate, and the message passes down to the centres in the lumbar cord where, by the mechanism just described, the reflex, is completed.

From this sketch of the nervous mechanism of urination it is evident that the causes that produce incontinence of urine may act in either one of the two ways:

First. Directly on the centres in the lumbar cord, making them more irritable or unstable, and in that way increasing their reflex excitability.

Second. Indirectly, through exaggerated reflex causes that influence both accelerator and inhibitory influences sent to the bladder. These impulses may be psychic, originating in the brain, or they may be the result of external irritation, originating in or near the bladder itself.

With this introduction we are prepared to consider how each of these factors above-named act in producing incontinence.

*First factor: An excitable condition of the nerve centres due to such irremediable causes as heredity and age.*

Nearly all children suffering from incontinence of urine have a neurotic family history, and by reason of this inheritance the child has other nervous symptoms associated with the incontinence. This inherited neurotic tendency is a very important ætiological factor, and acts no doubt by increasing the excitability of the centres in the lumbar cord, as a result of which reflex phenomena from external irritation are markedly increased. This cause of itself may not, as a rule, be sufficient to cause incontinence, but it always predisposes the child to this condition and makes it possible for genital irritation to find expression in incontinence. Age is a most impor-

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tant and little understood predisposing factor of incontinence of urine. We are greatly indebted to Dr. Clouston for his careful study of the relationship of the neuroses of childhood to the rapid metabolism and growth of brain tissue during childhood. The nerve centres during childhood are more excitable by reason of their immaturity. The great metabolism of nerve tissue incident to its rapid growth and development during childhood increases the sensitiveness of the nerve centres and exaggerates reflex phenomena. This for the most part is a cause which is more or less active in all children, but is much more active in some children than in others. Children that are pushed to rapid mental development more frequently suffer from the neuroses than dull children, and this is especially true of incontinence of urine, for it is a well recognized clinical fact that children suffering from this condition are, as a rule, precocious. This is because the rapid metabolism of nerve tissue, due to rapid brain development, increases the nervous excitability. While we cannot stop the normal metabolism of nerve tissue during childhood, we can speak out against the crime of pushing anæmic children to abnormal mental development.

But the importance of age takes yet greater prominence when one takes into consideration the physiological fact, demonstrated by Otto Soltmann*, that there is during childhood a functional immaturity of the centres inhibiting reflex acts. In early infancy inhibition is so feebly developed that we have a normal incontinence of urine. At this time the muscular fibres of the bladder, having no inhibitory restraint, are excited to action by such a very slight reflex cause as a small quantity of urine in the bladder. As the child grows older the mechanism inhibiting reflex act becomes better developed, and as a result the normal incontinence gradually disappears. But the study of inhibitory influences is of special importance in determining the influence of the will on urination. We will to urinate and the act is ac-

* Jahrbuch für Kinderheilkunde, Band ix.

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complished. We will not to urinate and the act is inhibited. From the brain the impulse passes to the centres in the lumbar cord, and the reflex motor impulse going to the bladder is inhibited. The great influence of the will is shown in the fact that incontinence of urine occurs with much greater frequency during sleep. At this time the inhibitory influence of the will is lost, and reflex contraction of the bladder may occur from very slight causes. The influence of the will is very slight in infancy, and this is one of the inhibitory influences spoken of above, the absence of which produces the normal incontinence of infants.

We have, then, in the excitability of the nerve centres due to heredity, and in the structural and functional immaturity of the nerve centres due to age alone, the great foundation causes of incontinence of urine. The importance of age alone as a predisposing factor is shown in the fact that children outgrow this condition, even the cases that resist all forms of treatment get well as the child grows older.

*The second great factor in producing incontinence of urine is chronic anæmia.*

The anæmia acts by producing a malnutrition of the nerve centres, and this, as we have elsewhere seen,* increases the reflex irritability of these centres, so that slight external irritation produces marked reflex phenomena.

The anæmia may also lessen the functional activity of the higher nervous centres of the brain, and in this way the inhibitory influence of the cerebral centres on the spinal centres may be weakened. For this reason the exaggerated reflex phenomena due to excitable spinal centres, would not be inhibited, even as normal reflex movements are, and this would still further exaggerate the reflex movements. Anæmia may therefore produce a very great exaggeration in the reflex expression of external irritants, and for this reason it takes rank as a most important cause of incontinence of urine. The causes

*ARCHIVES OF PEDIATRICS, May, 1893.

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of chronic anæmia may therefore be classed among the indirect causes of incontinence. I have elsewhere given* reasons for the belief that the most important causes of chronic anæmia in childhood are: Tuberculosis, with improper food and bad hygiene, rheumatism, malaria and syphilis; and these four chronic diseases are, in fact, the usual precursors of incontinence. Over one-half of the cases of incontinence of urine seen in dispensary practice at Cincinnati, Ohio, have a tubercular anæmia, about fifteen per cent. have rheumatic anæmia, and a smaller percentage have malarial and syphilitic anæmia.

There is a well-marked anæmia in eighty per cent. of the cases of incontinence seen in dispensary practice, and in nearly every instance the anæmia can be traced to one of the four diseases named. Clinical experience, therefore, confirms the conclusion that anæmia is a very important factor in producing incontinence of urine.

*The third and last great factor in producing incontinence of urine is reflex irritation.*

Reflex irritation has been considered by all writers on this subject as the all-important cause of incontinence of urine. And it is probably true that some form of reflex irritation acts as the immediate exciting cause of nearly every case of incontinence. But in about one-half the cases the cause of irritation is so slight that no important pathological condition can be found. In these cases the origin of the reflex may be a distended bladder or even a small quantity of urine in a normal or slightly irritable bladder, or some other condition which varies so slightly from the normal that it could only excite to action nervous centres made hypersensitive by neurotic inheritance and chronic anæmia or malnutrition. In the other half of the cases a more important genital, vesical or rectal irritation can be found, such as phimosis, preputial adhesions, polypi or granulation in the meatus, or in the rectum, fissure ani, changes in the urine, inflammation of the bladder, vagina or urethra, or some other cause that may act as an irritant in or about the rectum or external

*ARCHIVES OF PEDIATRICS, May, 1893.

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genitals. The first rule in the treatment of incontinence is to remove the cause of the external irritation, if any exist, and this alone is often sufficient to cure the disease. But it does not follow from this that the external irritation was the only factor in producing the incontinence, but it does follow that the other factors left after the removal of the external irritation were not sufficient to keep up the incontinence of urine. Phimosis and preputial adhesions are by far the most common form of external irritation producing incontinence. Yet only a small proportion of the boys having this condition suffer from incontinence. Reflex irritation is therefore only a factor and acts by producing this disease in children that have by inheritance or by chronic anæmia been prepared for the development of one of the neuroses.

From the argument presented in this paper I conclude that there are three important ætiological factors of incontinence of urine in children, viz.:

First. Excitability of the nerve centres produced by heredity and age.

Second. Anæmia or malnutrition increasing the excitability of the nerve centres.

Third. Reflex irritation.

These factors are interdependent and act together in producing this condition.

DISCUSSION.

DR. ROTCH said he could not speak too highly of such a paper, which showed the importance of not paying too much attention to any one factor in a given problem. This had been the great fault in the treatment of incontinence in children.

DR. CRANDALL said he had been interested in the paper on account of the light thrown upon one very doubtful point in studying this class of cases. It was quite certain that anæmia is one important factor. He also wished to compliment the author on this scientific paper.

DR. S. S. ADAMS said that a large majority of these patients are unquestionably anæmic, but it is exceedingly difficult to determine whether the malnutrition is the cause of the anæmia or the anæmia the cause of the mal-

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nutrition. He had been struck with the proportion of anæmic children found in our hospitals. In private practice, among girls particularly, the condition is neglected for so long a time before seeking medical advice that malnutrition is still often quite marked.

DR. GRIFFITH said that many of our dispensary patients who are not suffering from incontinence of urine are anæmic, and hence we should not be too quick to assume that anæmia stands in direct causal relation with the condition. Notwithstanding this condition it should be successfully treated. The only practical means we have for examining the blood is the determination of the hæmoglobin. A reduction in the hæmoglobin indicates a reduction in the specific gravity of the blood, and this means a reduction of all the important elements of the blood.

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## THE TREATMENT OF RACHITIS WITH THE LACTOPHOSPHATE OF LIME.

BY J. HENRY FRUITNIGHT, A.M., M.D.,

Attending Physician St. John's Guild Free Hospital for Children, New York City; Fellow of the New York Academy of Medicine (Pediatric Section), etc., etc.

A QUARTER of a century and more ago rachitis was a disease not very frequently encountered by the physician in this country. Owing to the large influx of immigrants and the consequent development of environing conditions analagous to those which obtain in the overcrowded centres in the old world, such as impure and insufficient air, lack of ventilation, improper and inadequate food, and the like, together with the increased difficulty of supporting a family properly—a result of this excess of workers—rachitis has become one of the most important and most common of the diathetic diseases met with among the humbler classes of our population. True, the influence of heredity must not be ignored, but this influence is emphasized and reinforced by the factors first alluded to.

As is well known, phosphate of lime ($Ca.OPO_5$)

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forms about fifty per cent. of normal bone. This proportion is much diminished in the changes of rachitic bones. It has, however, been demonstrated that some cases of rickets are not caused by a deficiency of lime in the bones. In such cases, therefore, there is not deficient ossification, but a deviation from natural growth; in short, a defective general or constitutional nutrition.

Yet poverty of lime salts has been demonstrated in rickety bones. Besides the important part played by a lessened supply of lime in the artificial production of rickets leads us to anticipate benefit from a free administration of this substance. It has been firmly established, physiologically, that lime, particularly in the form of the phosphate, is a regenerator of bone and nerve tissue, increasing the mineral constituents of these tissues, and that its effects are permanent.

In those cases alluded to in which the rachitis does not seem to be due to a deficiency of lime in the bony structures, the lactophosphate of lime has seemed to control this defective or perverse nutrition in such a way as not only to strengthen the skeleton, but also to improve the other structures.

Inasmuch as the phosphate of lime is an insoluble substance, I always prefer to give the lacto-phosphate of lime; for the reaction of lactic acid with the phosphate of calcium is soluble in all proportions of water and gastric juice. I usually administer it in the form of the syrup of the lacto-phosphate of lime in drachm doses repeated three or four times daily. This preparation of the remedy is officinal in the United States Pharmacopœia.

In commending the treatment of rachitis with this remedy, I do not in the least underrate the value of the phosphorous treatment in the manner suggested by Kassowitz of Vienna, and *first* so ably and so persistently advocated in this country by Dr. Abraham Jacobi. My difficulty has been to always obtain a sufficiently reliable and stable preparation, and consequently I was often doomed to disappointment in its use.

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I am also aware that many leading authorities deny any curative value to this medicine, ascribing all benefits to an improvement of the general hygienic surroundings of the patient. It is self-evident that a removal of deleterious influences must be secured, and an observance of correct hygienic principles insisted upon. Among our dispensary and tenement-house patients this cannot always be accomplished, and notwithstanding these theoretical objections, experience among this class of patients proves that more are benefited by the lime treatment than with other remedies. I will very briefly indeed sketch in bare outline the histories of a few cases taken at random from my experience during the past year. First, I will cite five cases which were treated at the St. John's Guild Free Hospital for Children in New York City.

CASE I.—Rachel W., two and a half years of age, was admitted to the hospital March 10, 1892. On admission, the child was suffering from a general catarrhal bronchitis, and was unable to walk. She was poorly nourished, the joints were somewhat enlarged, and the bony structure of the lower limbs was deficient. She kept her chair constantly, and made no effort to creep or walk. She was ordered one teaspoonful of the syrup of the lactophosphate of lime three times a day.

On May 31st, she crept about the floor for the first time, and made attempts to stand on her feet.

June 2.—It was noted that she was creeping about all day long.

June 14.—She was able to stand firmly on her feet, and attempted to step out.

June 25.—Extremities were much stronger.

In July she developed pertussis, during the course of which she had convulsions, and finally died; but before this her rachitic symptoms had practically disappeared entirely.

CASE II.—Antonio B., three and a half years of age, was admitted to the hospital on August 30, 1892. He had had pertussis fifteen months previously. On admission, he was unable to walk, his head was very large and rachitic in shape; he was fairly well nourisheds There was an enlargement of the epiphyseal extremitie

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of the long bones; the ribs were incurvated and very compressible; the epiphyses at the wrists and ankle-joints were markedly enlarged and bulky. There was no involvement of the cervical glands, and no history of syphilis. The child was intelligent. He was ordered syr. lactophospate of lime, one teaspoonful three times a day.

Sept. 13.—Much better; walked with little assistance.

Sept. 26.—Greatly improved.

Sept. 30.—He was able to walk without assistance, and was removed from the hospital by his parents in order that he might be taken to the country.

CASE III.—Francesco M., three years of age, was admitted November 3, 1892. For a long time the child had not been able to walk. The general condition was fair, the muscles of the lower extremities were somewhat flabby, the legs considerably bowed, and the epiphyses at the wrists were enlarged. He was ordered syrup lactophosphate of lime, one teaspoonful three times a day.

Dec. 30.—General condition much improved.

Jan. 7, 1893.—Child was able to walk without assistance.

Feb 13.—Discharged as cured with the exception of the bowing of the legs, which of course remained.

CASE IV.—Solvi C., three years of age, was admitted December 12, 1892. The child had a large rachitic head; the ribs were somewhat incurvated; the abdomen was hard and swollen, and the child was unable to walk properly. The general condition was fair. Syrup lactophosphate of lime was ordered, and under this treatment there was noticeable improvement, although there was alternate constipation and diarrhœa.

Jan. 11, 1893.—Walked very much better; general condition proportionately improved.

Feb. 20.—Walked without assistance.

April 4.—Improvement continues.

May 3.—Child was practically well.

CASE V.—Kate S., three years of age, was admitted September 26, 1892. She had the characteristic shaped head and an emphysematous chest; the epiphyses of the tibiæ and wrist-joints were enlarged; there was a good deal of sweating about the head, and the cervical glands were enlarged. The lower extremities were greatly

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wasted, and muscular power was almost entirely lost. She also had a foul-smelling purulent otitis media. She sat constantly in a chair or lay on the bed, as she was unable to walk.

She was ordered syrup lactophosphate of lime, one teaspoonful three times a day.

Oct. 15.—She tried to step out and to tread down when held under the shoulders.

Oct. 22.—Able to stand on her feet.

Oct. 31.—She took a few steps.

Dec. 1.—She was able to walk about the room without assistance.

Jan. 7, 1893.—It was noted that she was very much better, and could walk a distance of twenty feet.

Feb. 20.—Locomotion greatly improved, and she walked about without any assistance whatever. She may be considered as well.

It must be confessed that the removal of these patients from their unhygienic homes to the well-regulated wards of a hospital, with all which that implies, must have been an important factor in their speedy improvement.

The following four cases, among others, were treated privately. Of these only one family was in a position to improve its hygienic environment. The others lived in tenements of a medium grade, and were of course subect to their detrimental influences.

CASE VI.—Charles W., aged thirteen months. Had been artificially fed. Has no teeth; makes attempts to stand and walk, but does not succeed. His head is large. The epiphyses of the long bones are thick and large. Has rachitic garland on ribs. Is subject to laryngismus stridulus. Is pale and puny. Was put on the lactophosphate of lime, ℥i. four times daily. Within a few months he was able to walk without assistance; his bones are much firmer, and his general condition much improved. In six months it was no longer necessary to continue treatment.

CASE VII.—Baby F., aged eleven months; was artificially fed; has but one upper incisor tooth; has square-shaped head; anterior fontanelle still widely open. He is extraordinarily anæmic; the veins are very prominent; perspires profusely at the back of the head; his

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joints are somewhat large; his thorax is very compressible. We ordered ℥i. of lactophosphate of iron three times daily. Improvement was continuous until his discharge, about eight months after he was first seen.

CASE VIII.—Baby K., aged seven months. Breast-fed, but mother was a sufferer from Bright's disease. Both fontanelle's widely patulous; very anæmic; sweats very much about the occiput; veins of head very prominent; enlarged post-cervical glands; epiphyseal extremities of long bones thicker than usual at this age; no teeth; poorly nourished; appears to want to lie constantly. The lactophosphate of lime was given to her in ℥i. doses, three times daily, and within a year she was entirely free of all rachitic symptoms.

CASE IX.—Baby M.,aged eleven and one-half months; had been artificially fed from the beginning. It was in an extremely impoverished condition of health; very anæmic and fretful. It has alternate constipation and diarrhœa; a very thin neck; enlarged cervical glands; wrist and ankle-joints enlarged; the tibiæ somewhat bowed; the thorax flattened antero-posteriorly; had frequent attacks of bronchitis. The family were in very straitened circumstances, and their mode of living was in harmony therewith. The lactophosphate of lime was ordered, ℥i. four times daily, and within ten months the child is practically free from the aggravated symptoms of rachitis. He has become plump and round, his chest has more expansion, and though he is still under observation he may be considered as having overcome his rachitic tendencies.

It is understood, of course, that special attention was given to the feeding and bathing of all these patients, and I desire to acknowledge that some credit must be conceded to these agencies in securing a favorable result.

To bring before you these results of my experience and observation, to elicit discussion, to learn whether the same results have been realized by others in the use of this medicine, and if not, to again call their attention to this remedy, which should not be suffered to fall into disuse at this time when rickets promises to be so prevalent, are the motives of this short clinical paper.

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DISCUSSION.

DR. SEIBERT said he understood the author to say that Jacobi was the first to use the phosphorus treatment; he had always been under the impression that Kassowitz of Vienna originated this treatment.

DR. FRUITNIGHT replied that he only said that Jacobi firsturged its use in this country.

DR. SMITH remarked that it had been recommended by many foreign pediatrists. The statistics of this treatment collected from the Bellevue Out-Door Department were so unfavorable that after it had been used for a long time it was abandoned.

DR. ROTCH said the remedy had been tried in Boston in many cases, and yet had not met with any favor.

DR. WINTERS said that inasmuch as the cases detailed in the paper were on a better diet while in the hospital, it would be well to remember that rachitis will recover invariably, even with indifferent treatment, if the diet receive proper attention.

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## A CASE OF FALSE MENINGOCELE.

BY IRVING M. SNOW, M.D.,

Buffalo, N. Y

THE case to be described offers some features of extreme interest. It was characterized by the apparently spontaneous appearance of a subperiosteal effusion of fluid over the right parietal bone and by the rapid subsidence of the effusion after pressure.

My patient was a boy baby of eight months, a plump, healthy child. He was suckled by his mother and previous to April, 1892, was in good condition. At this time the mother stated that he was beginning to creep and stand, that he often fell and had slight bruises, but that she could remember none lately of any moment.

On April 7, 1892, the mother noticed a puffy swelling of about the size of a half dollar on the centre of the right parietal bone. For a day or two it slowly in-

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creased and softened; nevertheless the child seemed in no distress whatever. Neither spirits, digestion or sleep were disturbed. By April 10 the tumor was very much larger and the scalp seemed entirely separated from the skull on the right side of the head. The child was now taken to the family physician, who had the hair clipped and the scalp painted with iodine. On the next day the case was referred to me.

There was now a huge swelling, the size of one-half a lemon, on the right side of the child's head, giving it a very one-sided and ludicrous appearance. The tumor extended from one-half of an inch to the right of the sagittal suture to the same distance above the right ear. It occupied about two-thirds of the surface of the right parietal bone. Over the swelling the skin was somewhat stained and irritated by the iodine which had been applied; yet the mother declared that previous to this treatment the scalp had been of natural hue and was not discolored by a bruise. The tumor was not tender, did not show change in shape during crying or respiration. It was soft, elastic, fluctuated distinctly. Even by firm pressure it was not possible to feel the skull through the effusion.

The swelling was surrounded by the smooth surface of the parietal bone. The baby was in good condition, not objecting at all to the examination. It presented no symptom of rickets, craniotabes or nervous disturbance. The anterior fontanelle was nearly closed; temperature normal.

April 12.—Child in excellent spirits; temperature 99°. The swelling had increased in size until it occupied the whole of the right parietal bone and was bounded by the coronal sagittal, lambdoidal and squamous sutures.

From the absence of pain, fever and the signs of local inflammation it was certain that I had not to deal with an acute abscess. The sudden appearance of the swelling, its location away from the sutures and the child's age, excluded a meningocele. It was evident that the swelling was produced by the effusion of a fluid, prob-

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ably cerebro-spinal, between the periosteum and the bone. This I regarded as positive, as the swelling was distinctly bounded by the cranial sutures, over which in infancy the periosteum does not extend. Hence the tumor might be classified as a false meningocele, a cephalo-hydrocele—a cyst having the contents but not the walls of a meningocele. The fluid probably escaped from the subpial space through a tear in the dura mater and a fissure in the skull. Yet there had been no history of an injury to the head, there was no pulsation to the mass, the child had no symptom of cerebral injury.

April 13—A 20% ichthyol ointment was applied to the swelling, over this a pad of cotton was placed and a bandage was tightly drawn about the head. This procedure was repeated daily until April 16 without any improvement. Indeed the tumor continually grew larger, reaching the size of a half orange. The tension of the scalp increased so that the swelling bulged over the sutures.

April 16.—The right side of the head was covered with interlacing strips of adhesive plaster, the tumor was compressed so that it was almost obliterated.

April 19.—The head showed great improvement. There was now no fluctuation or puffyness of the scalp to be felt. The uniform pressure had caused the disappearance, perhaps the absorption of the fluid without cerebral symptoms.

April 26.—The twentieth day of the swelling and the tenth of pressure treatment. I removed the adhesive plaster. The effusion had entirely disappeared, there was no pain or discoloration where the tumor had existed. Careful palpation over the former site failed to discover any fissure, indentation or bony ridge. Further, the effusion did not recur from that day to this, a period of a year. Excepting for a dyspeptic diarrhœa of short duration, the child has remained in perfect health.

It is unfortunate that the cyst was not aspirated and its contents analyzed. But the case occurred in private practice and there is even in this aseptic day a differ-

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ence of opinion as to the advisability of this procedure, as unfortunate results have been reported even after simple puncture. Scarcely any doubt can exist that the fluid was cerebro-spinal lymph.

Assuming that the skull was fissured by some accident which the child's attendants did not notice or care to report and that cerebral fluid was poured out rapidly and in such quantities as to cause the high swelling which I have described, it is remarkable that after the pressure was removed that the fluid did not again leak through the crack in the parietal bone and cause a reappearance of the swelling.

We may, I think, fairly conclude that either the cranial fracture closed when the edges of the fissure were brought together by the plaster, or that the torn dura mater quickly united by a simple adhesive process, obliterating the channel through which the fluid escaped from the subpial space.

It is out of place for me to give before this learned society any review of the literature of false meningocele. It is sufficient to state that, according to all authorities, the puffy tumor of the head could only have been produced by an injury to the skull, causing a fracture of the bone or a tear in the dura mater and that the fluid under scalp was cerebro-spinal lymph.

These accidents and symptoms are peculiar to childhood. They are explained by the liability of children to falls on the head, by the thinness and elasticity of the cranial bones, by the ease with which the periosteum may be separated from the bone, by the close attachment of dura to the skull, by the relatively great intra-cranial pressure and the rapid secretion of cerebral lymph.

The lack of constitutional symptoms in the case and the success of the pressure treatment make the clinical history worthy of record.

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# NOTES ON TUBERCULOSIS IN CHILDREN.

BY WILLIAM OSLER, M.D.,

Professor of Medicine at the Johns Hopkins University, Baltimore.

## I. WHAT IS THE INCIDENCE OF TUBERCULOSIS IN THE FOUNDLING ASYLUMS AND CHILDREN'S HOSPITALS OF THIS COUNTRY?

IN preparing the article on tuberculosis for Starr's Handbook of Children's Diseases, I was surprised to find how few observations had been made on the prevalence of tuberculosis among the inmates of asylums and children's hospitals in this country. Northrup's studies in the New York Foundling Hospital show, as is well known, a startling prevalence of the disease. We miss, however, detailed statistics, the result of systematic clinical and anatomical observations, such as have been published during the past few years by our French and German colleges. The most reliable figures, of course, are those obtained in the post-mortem room. The manifestations are so protean that unless in fatal cases the clinical be supplemented by an anatomical examination, very many tuberculous lesions are overlooked.

The study would not only be interesting in itself, but directly beneficial in improving the sanitary surround-

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ings of the institutions, promoting that scrupulous cleanliness, that aseptic environment, quite as important (though we are apt to forget it) to the physician as to the surgeon. Whatever stand we may take on the question of heredity, the fact is indisputable that in the tuberculosis of children the enemy in a large proportion of cases enters through the ever open portals of the respiratory and alimentary systems. As the surgeon with a case of streptococcus infection in his ward knows that there has been some focus of infection, so in these instances, when we find the bronchial nodes or the mesenteric glands the seat of advanced disease, we should recognize definitely air or food contamination.

Attached to every foundling asylum or children's hospital there should be a paid pathologist, who should report yearly to the Board of Managers and to the Medical Board on the prevalence of tuberculosis in the Institution. He, better than anyone, would be in a position to furnish data upon which important sanitary changes might be based. In every institution so equipped four or five years' work would not only throw important light on the prevalence of this scourge, but would also give indications as to the best means for its prevention.

## II. THE FEVER OF TUBERCULOSIS.

The second point requiring study relates to the fever of tuberculosis. Usually, whether more or less continuous or definitely remittent, the fever is associated with active development of tubercles, their caseation, softening and suppuration, or with a peri-tuberculous pneumonia. The more definite hectic or intermittent type of fever in tuberculosis, with intermissions sometimes lasting for many hours of the twenty-four, is seen in children as in adults only in advanced cases of tuberculosis. In all these instances some definite relationship exists between the severity of the fever and the extent of the disease.

Our French colleagues have recently called attention to two other types of fever in tuberculosis which require

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study. Several years ago Landouzy described a fever in the tuberculosis of infants which sometimes was of such severity as to kill before any extensive lesions had developed. The children presented all the features of a profound infection, but at the autopsy comparatively trivial changes were found, either in the lungs or in the glands. This *febris tuberculosis peracuta* (fièvre infecteuse tuberculeuse suraiguë) has been recently referred to in the monograph of Aviragnet. The symptoms presented are those of a general infection rather than any local disorder, and in the child it is described as coming on insidiously, sometimes with vomiting; the tongue is red, sometimes dry; the fever range is usually high; the mental symptoms are marked, often a condition of profound depression; the abdomen is distended, sometimes painful; the liver and spleen are somewhat swollen. The symptoms are, in fact, those of a profound infection without definite local signs, and cases are described in which the disease has run its course in children in a very few days. The autopsy may show quite slight tuberculous lesion, perhaps only in the bronchial glands or a small area of tuberculous broncho-pneumonia, or the disease may be connected with a group of enlarged glands in the mesentery or the neck. The symptoms are believed to be caused by the toxins developed in unusual amounts under certain favorable conditions at the site of the local disease. I have never met with an instance of the kind in children, but there was a case admitted to my wards on the 13th of March last, which I believe to belong to this type. The patient, a man aged forty-seven, had a swelling on the left side of the neck, high fever and delirium. He had had an illness of four or five weeks' duration,and when admitted,the symptoms were those of a most profound infection without any local disease to be discovered other than that of the glands of the neck. Though his symptoms were highly suggestive of typhoid fever, the swelling in the glands of the neck seemed to be definitely tuberculous. He died on the fifth day after admission. The autopsy

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showed numerous punctiform hæmorrhages. There was a chain of tuberculous glands, yellow and caseous, on the left side of the neck, evidently of some age. The lungs were crepitant, and there was an area of commencing pneumonia with fresh pleurisy over it in the right lower lobe. There were scattered miliary tubercles throughout the liver and the spleen.

To another form of fever attention has also been called by our French colleagues, the *typho-tuberculose*, or continuous tuberculous fever, acute fever developing in connection with a tuberculous infection, but which, unlike the acute miliary tuberculosis, runs a favorable course. Apparently it may be one of the first manifestations of the invasion of the organism by the bacilli, but it may be the expression of what may be called an aborted acute tuberculosis, consecutive to some local disease, and Landouzy refers to it as a bacilliary toxæmia. The general symptoms are those really of typhoid fever, from which the diagnosis may be extremely difficult. It runs a course of from four to five weeks, and from the description and the temperature chart given by Aviragnet there must be extreme difficulty in its recognition from typhoid fever. In fact, as he remarks, whenever we find a child with a *cortege* of symptoms sufficciently marked to make one think of typhoid fever, but not sufficiently characteristic to make a clear diagnosis, the question should always be raised as to the existence of tuberculosis. Shall we then recognize an acutely developing fever continuous in character, associated with tuberculosis and differing from acute miliary tuberculosis in running a favorable course?

### III. GENERAL ANASARCA IN TUCERCULOSIS.

The following cases are of special interest from the fact that they were both admitted with general anasarca, the dropsy being due apparently to the blood condition rather than to any secondary nephritis associated with the tuberculosis.

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CASE I.—*General anasarca; albumin with hyaline and granular casts in the urine; cough; diffuse bronchitis; moderate fever; death on the fourth day. Tuberculous adenitis of the bronchial glands; tuberculous broncho-pneumonia; scattered miliary tubercles.*

Edith J., aged three, colored, admitted November 29, 1889. She was brought to the dispensary, November 14, with a history of an illness from about the first week in September.

The nature of this was doubtful, as it was said to be malaria with pnemonia at one time, and at another diphtheria or scarlet fever. At the dispensary, when first seen, the child was wasted and looked very ill. The abdomen and legs were swollen; temperature, 101°. The percussion note over lungs was clear; numerous râles heard everywhere.

Dr. Booker, who first saw the child, diagnosed tuberculosis and sent the case to the ward. On admission the child was in a miserable condition with general anasarca; closed eyes from œdema of the lids, ulceration at the angle of mouth, and numerous erosions on the legs. The child coughed frequently, and there was a bloody discharge from the mouth.

The physical examination was not very satisfactory on account of great œdema of the chest walls, but râles were heard everywhere. The urine was scanty, acid in reaction, and contained albumin and numerous leucocytes with hyaline and granular casts. The temperature did not range above 101°. Although the case was admitted with the diagnosis of tuberculosis I must say we leaned rather to the opinion that it was acute nephritis (following either diphtheria or scarlet fever) with anasarca and extensive pulmonary œdema. The child lingered and died on the fourth day after admission.

Post-mortem by Dr. Welch. Body 75 cm. long; general anasarca. On the inner surface of thighs, numerous, irregular, more or less serpiginous erosions of the skin, from many of which a watery fluid escaped; similar erosions on the surface of the buttocks and one of these on the left, evidently of older date. On the left hand the two last digits of fourth finger and the last digit of the third were gangrenous.

Peritoneum contained 300 cm. of clear fluid; the membrane smooth and pale; pleural cavities contained small amount of slightly bloody serum. The heart was distended with fluid, blood and fresh clots; valves normal;

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muscle substance pale, and fibres showed on microscopic examination extensive, diffuse, fatty degenerations.

*Lungs.*—Left; in the middle of lower lobe was an area of collapse and a few spots of ecchymosis. The upper lobe, dark-red in color and solid; and at the inferior margin and extending to the middle of the lobe is an area of solidification, which on section presented caseous areas surrounded by miliary nodules. The bronchial glands were large and caseous. The right lung presented a few pleural adhesions. On section the entire middle lobe filled with areas of grey tuberculous consolidations, in the centre of which was a small cavity containing pus. This was situated between the upper and middle lobes, and penetrated the tissues of each. Immediately below this cavity and adherent to it was a caseous bronchial gland.

*Liver.*—Large, pale and mottled with areas of intense congestion; the lymph glands of the hilus large and caseous. The kidneys were large, pale; capsules readily stripped off; corteces wide; striæ clear; microscopical examination showed intense fatty change of the tubules, particularly in those of the pyramids; slight degeneration in the vessels of the glomeruli and granular, fatty cells within Bowman's capsules.

*The Intestines.*—Tuberculous ulcer in the ileum just at the orifice of the valve.

In Douglass' fossa there was a caseous mass below the peritoneum.

CASE II.—*Primary tuberculosis of the intestines; diffuse tuberculosis; general anasarca.*

William L., colored, aged nine, admitted October 17, with general anasarca. The father, one brother and one sister living; two died when quite young. The mother is dead; cause unknown.

The patient had whooping-cough some years ago; never has been ill since that time.

Six months ago the present illness began with pains in and gradual swelling of the abdomen; the appetite, however, remained good; bowels regular and he had no cough. He has gradually grown weaker and has lost in weight. It is not easy toget a satisfactory account of his illness from the friends. The condition of general œdema has, they say, existed for several months.

*Present Condition.*—Child is emaciated; eye-lids œdematous; face puffed; mucous membranes pale. The hands and wrists are swollen; the legs and feet are

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œdematous, and the abdomen is much swollen. Pulse is regular, the tension not increased.

*Thorax.*—The resonance is good in front and behind, except at the right base, where there is some flatness and slight movable dullness. The respiratory sounds are harsh and puerile, with occasional sonorous and sibilant râles. On the right side the breath sounds are distant, and become very feeble in the lower part of the chest. Cardiac impulse is in the third, fourth and fifth left spaces; point of maximum impulse apparently a little outside of the nipple line in the fifth interspace. The sounds are clear at the apex, with a soft systolic murmur in the pulmonary area, and the second sound is here accentuated.

The abdomen is much distended, soft and humid; no definite fluctuation, though there is slight movable dullness in the flanks. The border of the liver cannot be felt; nor is the spleen palpable.

The urine was 300 cc. in amount; sp. gr. 1013; acid; faint trace of albumin; no casts were found.

On the day after admission the child seemed bright in the morning; then suddenly became unconscious; the pulse was extremely feeble and could scarcely be counted, though the heart beats were loud and clear. About 11.30 the respirations became very slow, only seven to the minute, and extremely jerky, and he died about 12 A.M.

*Autopsy.*—(By Dr. Flexner.—Abstract.) *Anatomical diagnosis.*—Primary tuberculosis of intestines secondary of mesenteric and retro-peritoneal lymph glands; miliary tuberculosis of peritoneum, liver, pleura and lungs. Tuberculosis of bronchial glands; general anasarca.

Peritoneum contained several thousand cc. of chylous fluid. The left lung was firmly adherent. In the right pleural cavity there was a considerable quantity of clear fluid. The pericardium smooth.

*Lungs.*—Left costal pleura thickened and inherent. The lung is crepitant throughout, and in the upper lobe close to apex were two or three fresh-looking, wedge-shaped, hæmorrhagic areas surrounding minute tuberculous broncho-pneumatic cavities. In the right lung there were one or two small tuberculous areas at the apex. The bronchial glands were pigmented, and contained cheesy masses. There were one or two small superficial ulcers in the larynx.

The heart was normal. The liver contained numerous miliary tubercles. The kidneys were swollen, capsules

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stripped off easily; substance firm, pale; the striæ almost invisible; no tubercles.

*Intestines.*—"Fifty cm. below duodenum was an extensive and circling ulcer, the edges of which were undermined, the base irregular, worm-eaten, and contained necrotic grey and yellow material. It extended to the muscular coat, and the peritoneum over it was thick and opaque. At the mesenteric detachment there was considerable thickening and infiltration of the tissues. These girdle ulcers occurred at varying intervals throughout the small intestine, separated from each other by a few cm. There were in addition circular or oval smaller ulcers. On the peritoneal coat, corresponding to the ulcers, were numerous nodules of an opaque white and yellowish color. In the cæcum corresponding with the mesenteric detachment was a closely adherent tumor mass composed of caseous glands united by infiltrated fibrous tissues. The omentum was adherent over this mass, and when torn away the underlying tissue contained large and small tubercles. The cæcum itself presented an extensive deep ulcer, occupying almost the entire mucous membrane. The rest of the large intestine was healthy except the rectum, which presents a small ulcer."

*Peritoneum.*—In addition to the nodules corresponding to the ulcers the peritoneum generally was sprinkled with tubercles varying in size from a pin's head to a hemp seed. Between the liver and the diaphragm were masses of caseous tubercles and tuberculous granulation tissue, and tubercles were seen on corresponding points of the pleural surface of the diaphragm. The mesenteric glands were enormously enlarged and converted into caseous masses. The retro-peritoneal glands are also swollen and caseous.

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## GASTRIC NEUROSIS IN CHILDHOOD.

BY IRVING M. SNOW, M.D.,

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BY the light which chemistry has thrown upon the physiology and pathology of digestion, it has become possible to accurately describe and separate the various

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phases of gastric disturbances. Thus the attention of medical men has been attracted to a group of symptoms —vomiting, fever, hypersecretion and irritability of the stomach, which are independent of dietetic errors or of organic disease. These disturbances, called gastric neurosis, have been occasionally observed in adults, yet, to my knowledge, no case such as I am about to report is to be found in Pediatric literature.

My patient is eight years old, Anglo-American; father is a physician. The child's ancestory and antecedents are distinctly neurotic. The paternal grandfather was alcoholic, the mother suffered from eclampsia in infancy and is now rheumatic. She gave birth to four children of whom my patient is the second. The eldest, a girl, died of epilepsy at six, the two youngest children, boys, had convulsions at infancy. While pregnant with my patient the mother was much harassed by the frequently recurring fits of the daughter who died. Nevertheless, the child was born at the full term after a normal labor, and was suckled by the mother. She was weaned at ten months. At the eleventh month the two lower inciser teeth appeared. After this dentition was arrested until the eighteenth month when the remaining teeth appeared. The child walked at twenty-two months but was weak muscularly and is said to have had a large head. As all of the other children were late in teething it is to be presumed that all were more or less rachitic.

My patient had measles at three years, and varicella at six years.

At nineteen months the attacks, which I have called gastric neuroses, begun. In November, 1887, the child, while in apparently perfect health, digestion in order, and the bowels moving daily, was seized with a convulsion. There was choking, lividity, tonic and clinic movements of the limbs. After the spasm, the child commenced to vomit an acrid, watery fluid. All food medicines given were rejected.

Except for the irritability of the stomach the child seemed in no particular pain. The temperature varied

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between 100. and 10.5°. During the illness laxatives were given and produced loose passages, but did not relieve the vomiting or fever. At the end of five days the attack terminated and the child quickly regained her usual strength and appetite. She was now given santonin with the idea that the illness was due to intestinal worms. For ten months her condition was good. In September, 1888, the second attack took place. It was identical in all of its symptoms with the first illness, being ushered in with eclampsia, followed by nausea, vomiting and fever. The child lay in this state five days, showing symptoms of grave exhaustion from the frequent vomiting spells and from her inability to retain nourishment. During the illness the child had no passage from the bowels except when laxatives were administered. It must, however, be remembered that all food had been vomited.

Again, all of the symptoms disappeared abruptly and there was an interval of perfect health. From Nov., 1888, to Jan., 1889, two months, the child was secretely given large doses of santonin by a relative. When the mother returned from a visit the child's face was covered with yellowish blotches. In 1889 the child had two attacks with convulsions. Child ill each time five days. The September illness was marked by the discharge of several lumbricoid worms; it was not, however, particularly severe. An attack in May, 1890, differed from the preceding ones in that there were no convulsion. However the nausea and vomiting were complicated by an acute tonsilitis.

It is now to be noted, that although the illnesses were not accompanied by eclampsia, yet they occurred with greater frequency, taking place every six weeks from May, 1890 to May, 1892. Once the child vomited blood profusely, and the vomiting always brought her to an alarming state of prostration. The parents sought in every way to improve the child's health, by changes in climate, and by a strict regimen in diet and exercise.

In May, 1892, the family were in Heidelburg. It was found that the child had hypertrophed tonsils, and they

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were removed. The operation was followed by acute vomiting for two weeks which was undoubtedly aggravated by the persistent local treatment of the throat, as an exudate in the tonsils gave rise to a suspicion of diphtheria. The next attack was in August, 1892; the next in December, 1892. Each time she was attended by a physician. The illness lasted four days. Temperature varied from 100° to 101°, only once reaching 103°. Pulse between 110° and 120°, regular in rhythm.

About Jan., 1893, I first saw the child, she had been ill ten days with the usual symptoms, and the parents were alarmed at the extreme condition of weakness to which she was reduced. I found the little girl lying very quietly on her back with the knees drawn up. She refused to speak, to stir, to take anything into her mouth. The face was of an ashen hue, tongue slightly coated, T. 101½, P. 126, pulse and respiration regular. There was no headache. Lungs, heart, liver, spleen, urine—normal. The abdominal walls were markedly retracted, liked the boat-shaped belly of tubercular meningitis. Through the abdominal walls a strong aortic pulsation could be felt. Abdominal palpatin did not give her any pain, but about two inches to the right of the umbilicus there was a small lump, probably a knot of intestines. There was no hernia. A rectal examination gave no information. The knee jerks were normal, there were no areas of anæsthesia. During the ten days' illness there had been one passage from the bowels after an injection. Now, although gastric irritability was present all of the time, there seemed to be degrees in it, periodically, every 1, 2 and 3 hours. The little girl would feel a burning distress in her stomach, she would be much nauseated, would swallow water and vomit a very acrid fluid.

In physique, she was a slender, rather undersized girl, not anæmic. She was intelligent and amiable in disposition, not particularly emotional, did not walk or talk in her sleep, or wet her bed. There was no evidence of petit mal, no history of headaches. The parents informed me that during the intervals of health her appetite, digestion and

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bowels were in a normal condition. All medication food which I prescribed were vomited. The intestines then were irrigated and an enema of Epsom salts, glycerine and turpentine was used. The discharge of a small amount of normal, fæcal matter, but no relief, was the result. On the 14th day of the illness the symptoms disappeared abruptly and spontaneously, and the child soon played, ate and slept as usual. Tonics, baths and outdoor life were advised.

In seven weeks I was summoned again. After a puzzling lesson in substraction the child complained of feeling ill and was sent home from school. The usual train of symptoms followed, nausea, vomiting, fever, retracted abdomen. As I have said, gusts of gastric distress occurred every 2 or 3 hours; at these times she swallowed large draughts of water. The fluid ejected was intensely acid and, subjected to the Phloro glucin-vanillin test revealed an excess of free hydrochloric. My little patient was now given alkalies in large quantities—sodium, bicarb, magnesia, and bismuth—but the water in which these drugs were given was eventually vomited up, the fluid being intensly acid from hydrochloric acid. It was now evident that the frequently recurring burning and nausea was due to a periodic secretion of gastric juice, as spontaneous nausea and the vomiting of an acid fluid were closely associated. As the alkaline treatment was a failure, I concluded that the vomiting might have a cerebral origin, and gave large doses of chloral and bromide by rectum. After this the vomiting ceased and she slept 29 hours, save a half hours' intermission, and awoke refreshed with normal digestion and appetite.

She was now taken out of school, given morning baths, daily gymnastics, after the Sargent system, and also took iron, arsenic and strychnin as a tonic.

On the last day of March, she and her father and her brothers had an attack of influenza. In this sickness she vomited twice—no hydrochloric acid present in ejecta. No other disturbance of health has occurred.

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When we review the case which has just been narrated we are first impressed by the neurotic antecedents of the child. The mother suffering from eclampsia in her infancy transmitted this tendency to all of her children, all of whom are afflicted with convulsions and the eldest succombs to epilepsy.

With the little girl, whose pathetic history you have heard, acute vomiting is at first associated with eclampsia. At the age of five years, although the gastric attacks continue, the convulsive symptoms disappear, the illnesses are separated by periods of perfect health of from 6 to 25 weeks, the attacks usually last 5 days, the longest terminated in 16 days, vomiting is accompanied by fever and a boat-shaped abdomen, but by no abdominal tenderness or cerebral symptoms. We must also remember that, with the continual gastric irritability, there are periods of acute distress in the stomach, burning nausea and the expulsion of highly acid gastric juice.

The child's whole life had been carefully observed as the father was a physician. Some thirty attacks have taken place. Aside from them, the gastro intestinal functions were normal.

Renal diseases, malaria, hermia, eye strain and organic brain disease may be excluded as etiological factors. The attacks may be clearly distinguished from acute or chronic indigestion, whether gastric, hepatic or intestinal. Acute catarrhal gastritis may be traced to some accident or indiscretion in diet or is a symptom of an acute disease and commonly ceases when the operating cause is removed. The ejecta consist of food, mucus, etc., and do not persistently contain free hydrochloric acid.

The attacks are not due to toxæmia from acute or chronic constipation as: (1) They are separated by intervals of perfect health with normal evacuations. (2) The symptoms are not relieved or shortened by laxatives or by intestinal irrigation. (3) The tongue is not always coated, the abdomen is not tender or distended but is markedly scaphoid.

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In many ways, the clinical picture recalls the gastric crisis of tabes dorsalis, lacking, of course, the intense pain and the evidences of organic nerve lesion.

How can this group of symptoms be clothed with a name except by calling it a gastric neurosis. It is well known that periodical hypersecretion and hyperacidity may occur as a primary neuroses independent of organic disease. The explosions is perhaps hastened or accentuated by the absorbtion of ptomanies and bear in the regularity of their occurrence some remote resemblance to epilepsy.

The case appears to me to be unique in medical literature, but I believe the condition to be not infrequent. I have described it in detail, hoping to learn from the experience of others: (1) If my conclusions are correct. (2) To receive some clue to a more scientific treatment.

## DISCUSSION.

DR. HOLT said that he had under treatment for the last two years a case which in almost every particular paralleled this one. The child was also in a physician's family, and was seen by many distinguished physicians in New York in the early years of its life. In some of the earlier attacks two of these physicians made a positive diagnosis of tubercular meningitis. The attacks began during infancy and had recurred every few months until he first saw the child two and a half years ago, he being then about seven years of age. The attacks occurred sometimes without apparent exciting cause, sometimes one could be given, and they lasted two or three days, regardless of treatment. The one prominent symptom was persistent and uncontrollable vomiting, sometimes as frequently as seventeen times in a single night. During the attacks there was scarcely any increase of temperature; the child lay in a semi-stupid state with retracted abdomen and with occasional irregularity of pulse or breathing. In the observation of this case he had had the advantage of the co-operation of Dr. C. A. Herter, who has done much in careful urinary analysis. It was found that the excretion of uric acid during the interval was about normal, one of uric acid to fifty-six of urea, and during the heighth of the attacks, the excretion of uric acid sunk to one to one hundred and fifty-nine. All the quantitative analysis were from the urine of the entire twenty-four-

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hours. When the symptoms had subsided, the urine would appear to be loaded with uric acid, but examination showed it to be normal urine only very much concentrated. The first light thrown on this case was the fact that the urine was precisely like that seen in adults in cases of migraine. Careful dietetic treatment was employed, sugar being entirely prohibited, while the use of starches was restricted. He was allowed milk, plenty of meat, bread and fruits which were not very sweet. This was followed by the most striking improvement. Prior to this, he would have three or four attacks in the summer, but now he has had none, with the exception of one very trivial attack, for sixteen months. He came of a very neurotic family, his father having died of meningitis, and his family throughout being highly nervous. It was hard to say just how to classify these cases; the symptoms seemed to be associated with the elimination of uric acid. We see the condition pretty frequently in a much milder degree.

DR. CHRISTOPHER said he was strongly reminded of a similar case, that of a railroad man whose attacks were like those described in Dr. Snow's case, except that there was no elevation of temperature. His diagnosis was migraine without headache. According to Haig, migraine is a uric acid explosion. He had personally made the quantative examinations of the urine, using Haig's method of estimating the uric acid. It is sufficiently accurate for clinical work. While the proportion of uric acid to the urea would be normal in the intervals, during the attacks it would be enormously reduced. At one time he succeeded in warding off an attack by using nitro-glycerine and large doses of hydro-chloric acid. His dietetic treatment had been exaetly contrary to that described by Dr. Holt; that is to say, the quantity of meat was diminished, and sugars, starches and fruits were allowed, and with very satisfactory results. He did not see how we could reconcile the two statements except on the supposition that we know very little about uric acid.

DR. ROTCH said the subject was one of extreme importance, and one to which he had directed his attention for many years. Eight years ago, he published an article on this very subject but little had since been said about it. The cases are not usually recognized although they are not very uncommon. He had had quite a large number of them. At the time he wrote the article referred to Professor Leyden also published corresponding cases oc-

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curring in adults. He thought they were most commonly classified as ordinary cases of indigestion. In his opinion the dietetic management had nothing to do with the cases. Dr. Holt's investigation might throw much light on its relation to urea and uric acid. His own idea was that it was a reflex disturbance. Probably future study will show that the great sympathetic abdominal ganglia are involved. He recalled a case in which one attack was brought on by a blow on the epigastrium. They do not necessarily occur among the neurotic, and they follow many very different causes. They may be found in infancy and middle childhood, and he had followed cases from the age of eight months to the age of fifteen years. In infants the intervals are much shorter than they are later on, and it is quite serious among them, as they are liable to die from exhaustion. The pulse as a rule is intermittent, this being more marked the younger the patient. There is no one constant symptom except the vomiting, and the diagnosis is arrived at entirely by exclusion. Tubercular meningitis is the disease most frequently mistaken for these cases in the beginning. The temperature is usually normal or subnormal, although it may become elevated from nervous influences. As a rule the attacks are self-limited. The younger patients will vomit at intervals of about a quarter of an hour; later on at longer intervals. The proagnosis was in his experience favorable. The treatment he advocated was starvation for twenty-four or thirty-six hours, and quieting the nerve centres by medicines administered only by the rectum. The main two factors in the treatment are the tiding over the attack, and the lengthening of the intervals. Recovery is very abrupt. The appetite and digestion return immediately afterwards. He had tried all sorts of dietaries and remedies by the mouth and had found that none of them had any influence in shortening the attack. He had made no examinations for free hydrochloric acid, but thought this was a useful point, and one which might in the future render important aid in diagnosis.

DR. SEIBERT said if Ewald, of Berlin, had had Dr. Snow's case he might say that it was due to hyperacidity by the same reasoning that might lead Dr. Herter to consider it due to the diminution of uric acid. Hyperacidity of the stomach and diminution of uric acid in the urine are simply symptoms of the disease, and he fully agreed with the last speaker as to the etiology of these cases. It is a very curious fact that he also had had a case of this kind

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in a physician's family. This boy had five attacks of supposed meningitis before the age of four years, at which time the speaker first saw him after the death of the father. He had three different consultant's all of whom had made a diagnosis of meningitis. In each case the exciting cause had been constipation in the ascending colon; there had been slight rise of temperature and some pain. The vomiting had been controlled by ice bags. In all of the attacks the symptoms persisted for at least three full days. High irrigations were given in the colon, and then the boy was inverted and massage of the colon performed. Usually within an hour after, the fæces were dislodged and the boy was able to retain food as well as before the attack.

DR. HOLT here rose to disclaim for Dr. Herter and himself the statement that uric acid is the cause of this condition; it is simply one of the most striking clinical features.

DR. KOPLIK said that in a great many cases of acute indigestion in children examined abroad, and some he had examined himself, it was very unusual to find hyperacidity; the reverse condition is usually present, as detirmined by the chloro-glucin and other tests; hence the importance of Dr. Snow's observation on the increased acidity of the dejecta.

DR. FORCHHEIMER said he had seen a great many of these cases, and suggested that the urine be examined not so much for the amount of uric acid, but in regard to the presence of toxalbumins. Improper feeding is usually the the first factor. His own theoretical view had been that possibly for the same reason that Brush had given for the changes in the liver in artificially fed calves, the filtering function of the liver had been interfered with and as a result certain intermediate products between albumin on the one hand and peptones on the other were formed and caused irritation of the centres, and an attempt on the part of the stomach to eliminate these toxic products. He had the best results from the dietetic treatment described by Dr. Christopher, and this seemed to confirm his theory. He had used non-albuminous food with the exception of milk because he had found that the intermediate products formed in milk were less harmful than those formed in meat digestion.

DR. CAILLÉ had seen a number of such cases, but had never felt sure as to the exact condition present, whether it was purely a neuroses or a faulty digestion. He had found bile in the vomited matter during the attack, and in

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the urine immediately afterwards for a period of two or three days, after which it disappeared. He had also associated these attacks in a general way with some faulty process in the liver.

DR. CHRISTOPHER thought the case of Dr. Snow should be carefully differentiated from similar trouble in the intestine. His own case was certainly of intestinal origin, the latter are exceedingly common and are due to hepatic incompetence.

DR. ROTCH remarked that in many cases diet had been so carefully supervised that this cause could be excluded and, without doubt, constipation could not exist in a large number of the cases.

DR. SNOW in closing the discussion said he also believed that constipation and diet had little or nothing to do with these cases. He hoped the subject would not be investigated with a preconceived notion of the cause of the condition. He was surprised that so many present had seen such cases, for he had found great difficulty in finding in medical literature any mention of them.

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## CAUSES OF RACHITIS.

BY J. LEWIS SMITH, M.D.,

New York.

*Inheritance.*—In a certain proportion of rachitic cases we are able to discover a parental cause. Poor digestion and deficient assimilation in the infant, which are important factors in causing rachitis, apparently result in certain cases from disease or cachexia of one or both parents. Among the parental causes may be mentioned poverty, hardships, and defective nutrition of one or both parents, age of the father, and exhausting discharges of the mother, such as purulent, hæmorrhoidal, or uterine fluxes. The offspring of a tubercular, syphilitic, or otherwise enfeebled parent is more likely to become rachitic than is one of healthy and robust ancestry. We will especially emphasize the syphilitic dyscrasia in either parent as a po-

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tent cause, but M. T. Parrot in his thesis, published in 1872, evidently went too far in attempting to show that congenital syphilis is the common cause of rachitis. Most rachitic cases are entirely free from the syphilitic taint, and a large proportion of the children who have inherited the syphilitic dyscrasia do not exhibit auy signs of rachitis.

*Insanitary Conditions.*—Rachitis occurs most frequently in its severest forms in the damp, dark, filthy and overcrowded tenement houses of the city. There can be no doubt that general mal-hygiene, due most frequently to poverty and the unsanitary environments of the family, frequently cause or strongly pre-dispose to riekets even in those that are born healthy.

*Food.*—Of the anti-hygienic conditions which give rise to rachitis the most common and efficient appears to be the use of food not sufficiently nutritive, or if nutritious, not suited to the age and digestive powers of the child. The use of thin and poor breast milk, and artificial food of poor quality, or not suitable for the stage of growth and development, is a common cause of rachitis. Those children who have been prematurely weaned, and who have been given food which is not a proper substitute for the natural aliment, and those too long wet-nursed by scantily-fed and poorly-nourished mothers, and not allowed the additional nutriment which they require, are especially liable to this disease. Those children whose digestive power is feeble, from whatever cause, are more liable to become rachitic than are those who, in a state of robust health, have a hearty digestion. Hence rachitis occurs as a sequel of various protracted and exhausting maladies during infancy.

Cases of rachitis might be related occurring during the use of certain of the proprietary or commercial foods I have examined the analysis of these foods made by Prof. Leeds in order to determine what ingredient is lacking, and they are found to contain a considerably smaller proportion of fat than occurs in human milk. Too little fat in the food may, as Cheadle observes, be one of the

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chief dietetic causes of rachitis. Infants suckled by healthy mothers or wet-nurses, who have an abundance of milk of good quality, do not become rachitic as long as their nutriment is derived from this source. But those prematurely weaned and given a diet deficient in nutritive properties, and those who are allowed the promiscuous food of the table, or have largely a farinæeous diet during the first twelve or eighteen months, when the food should be chiefly milk, are especially liable to become rachitic.

It is an interesting fact and one that throws light on the dietetic cause of rachitis, that it does not occur in Japan. Physicians who have had abundant opportunities to observe the diseases of the Japanese, state that they have never seen or heard of a case among them (A. S. Ashmead, M.D., N. Y., Med. Rec., Oct. 15, 1890). M. Remy, in his "Notes Medicales sur le Japan," (Arch. Generales de Med., vol. I.–II., Paris, 1883) says that the Japanese women have a remarkable abundance of milk, and they suckle their young until the age of five or six years, but the nurslings are also allowed artificial food after their first year. Remy's explanation of the immunity of the Japanese from rachitis is as follows: "The Japanese have always eaten plentifully of fats and oil of fishes, the blubber of the whale, the eel and the loach especially. . . . The universal use of the food under notice from the time of ancient Buddhist flesh prohibition, but especially the consumption of fat by the lactating women, together with the fat given to the children, as supplement, which at that time is allowed them by Japanese tradition, are, in my opinion, main causes of the non-existences of rachitis in Japan.

Observations on the feeding of animals have also aided in the elucidation of the causation of rachitis. Guerin gave certain puppies a diet of meat four or five months, and they became markedly rachitic, while other puppies of the same litter suckled by their mothers remained well. At the meeting of the Section of Diseases of Children of the British Medical Association, held in August, 1888, Dr. W. B. Cheadle read an instructive

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paper on rachitis, in which he said that the results of feeding young animals in the Zoölogical Gardens strongly supported the theory that deficiency of animal fats and earthy salts is the most important agent in producing rickets. He states that in the Zoölogical Gardens the young monkeys taken from their mothers and fed with a vegetable diet, chiefly fruits, became rachitic. Such diet was destitute of animal fat and was deficient in proteids and earthy salts. Two young bears were fed with rice biscuits and occasionally with lean meats, which they licked but rarely ate. Fat, proteid and lime salts were practically excluded from their food. The bears died of extreme rickets while still young. Cheadle also states that more than twenty litters of lions had died successively of rachitis, and the next brood were fed with cod liver oil, purified bones and milk. In three months all signs of rachitis had disappeared. The addition of fat and bone salts to their diet had apparently caused the change. Eighteen months subsequently when the last observations were made, the brood of young lions were strong and healthy. They had received, in every respect, the same treatment as the litters which had perished, except as regards the diet. The latter had been fed with the carcasses of old horses which are destitute of fat, and whose bones resist the lions teeth.

The theory that lactic acid is the causal agent in rachitis has been strongly advocated by Dr. C. Heitzmann, formerly of Vienna, but now of New York. He administered lactic acid by mouth and subcutaneous injections to five dogs, seven cats, two rabbits and one squirrel. The lactic acid administered to the dogs and cats with "restricted administration of calcareous food," was followed by the characteristic enlargement of the epiphyses, and finally by the "curvatures of the bones of the extremities." After four or five months of the administration of lactic acid the shaft bones were very flexible, and repeated inflammation of the mucous surfaces had occurred—of the conjunctiva, bronchi, stomach and intestines.

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But in many cases of rachitis there is no evidence of an excess of lactic acid, and an objection to the lactic acid theory, apparently valid, is that lactic acid produced by imperfect digestion would unite with a base (either sodium or potassium) in the blood, which is always alkaline before it reached the osseous system.

The more the causation of rachitis is elucidated by observations on man and experiments on animals, the stronger is the evidence that its cause is dietetic, that there is a failure to receive or to digest and assimilate certain important substances in the food, particularly the fat, phosphate of lime and the proteid. The deprivation of these alimentary substances produces the rachitis dyscrasia, which is manifested by malnutrition in many tissues. Of course general anti-hygenic conditions, which lower the vitality, may, as we have stated elsewhere, be a factor in causing rachitis.

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## ERYSIPELAS OF THE FACE AND SCALP IN AN INFANT, AGED SIX WEEKS; RECOVERY.

BY SAMUEL S. ADAMS, M.D.,

Washington, D. C.

F. X., male, Italian, aged 6 weeks, was first seen by me on the morning of November 27th, 1892, and the following history was obtained:

Father is said to have just recovered from an attack of acute tonsillitis, but now has the appearance of having a syphilitic rhinitis. The mother's general health is excellent, except that she has an attack of follicular tonsillitis. A brother, aged 17 months, is now convalescing from acute follicular tonsillitis. The infant was delivered, after a normal, labor by Dr. O'Dwyer of this Society, but has had a slight mucus discharge from the mouth and nose since birth, which the doctor was treating when the family re-

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moved to Washington. He retired on the evening of the 26th, apparently in better health than he had been for several days. Early on the morning of the 27th, his mother was awakened by a peculiar rattling noise which she attributed to the mucus, but which she found was accompanied by oppressed breathing, high fever, restlessness and twitchings of various muscles. She administered several doses of syrup of ipecac and he vomited a quantity of ropy mucus with some relief. At 8 A.M., after sleeping quietly for several hours, he refused to nurse and began to have attacks which the nurse thought premonitory of convulsions. These attacks increased in frequency and severity until 1 P.M., when I was called.*

*Present Condition.*—General Appearance. My first thought as I saw him lying in his nurse's arms, was, why have they sent for me? He had every appearance of a moribund child. Temperature high.

*Cutaneous System.*—The skin was cyanosed, covered with a cold, clammy sweat, and intact except at the left ala nasi, where there was a slight excoriation at its angle, which was covered with mucus.

*Circulatory System.*—The pulse was so rapid that it could not be counted, its tension was weak and the fontanelle was bulging.

*Respiratory System.*—Nose occluded by mucus; pharyngeal wall and tonsils slightly hyperæmic, but no evidence of acute inflammation. Lungs both anteriorly and posteriorly clear, except râles transmitted from the upper air passages. Respiration 80 per minute.

*Nervous System.*—The eyeballs rolled and the muscles trembled as if he had recovered from a convulsion. Sopor.

*Digestive System.*—Appeared normal from the well digested stools. He refused to nurse. No vomiting except from the effects of the ipecac.

*Genito-Urinary System*—Prepuce adherent and non-retractable, but not occluding the meatus. Urine scanty and high-colored, staining diaper reddish-yellow.

* It is but just to the parents to state that they had been referred to me by Dr. O'Dwyer and had been looking for me all the morning.

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The most painstaking examination failed to disclose any organic disease, hence attention was directed to the relief of the nervous system by reducing the temperature and unloading the intestinal tract, for which purpose suitable doses of calomel and phenacetin were ordered. The hot bath was to be given if the supposed convulsive attack re curred.

8 P.M.—About 3 o'clock he had another "nervous attack." After that he slept quietly for several hours. The cyanosis has disappeared, his respirations are nearly normal, the rectal temperature is 102° Fahr., and he has had two liquid stools. As he still refuses to nurse he is fed breast-milk from a spoon. Sponge-baths of equal parts of alcohol and tepid water are to be given when the rectal temperature rises above 103°.

Nov. 28th, 10 A.M.—He slept quietly during the night, had several liquid stools, and now appears to be better, although he cries when moved, his temperature is 101°, and his pulse and respirations very fair. He still refuses to nurse. Urine scanty. The calomel and phenacetin having had the desired effect were discontinued and mercury and chalk ordered under the belief that the rhinitis was congenital and specific.

6 P.M.—Has passed a very comfortable day, but will not nurse and cries whenever moved. Again, a careful examination failed to aid me in making a diagnosis. Temperature, respiration and pulse fair.

Nov. 29th, 10 A.M.—Had a very restless night, his temperature went up to 104°, had two stools, passed but little urine and screamed when moved. The effusions and cold cloths to the the head had not reduced the temperature, although they may have prevented it from rising higher. His parents, believing the nasal trouble to be the cause of his discomfort, requested me to call a laryngologist. Dr. Hyatt met me in consultation, but failed to find any organic disease to account for the alarming symptoms. He suggested gin to relieve the kidneys and advised a continuance of the blue powder since the nasal symptoms had so rapidly improved.

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5 P.M.—Consultation. Patient still improving and has nursed a few moments several times during the day. Temperature 101°, and pulse and respirations nearly normal. Several well digested stools and a slight flow of urine. The affusions were to be used in case of rise of temperature.

Nov. 30th, 10 A.M.—Consultation. Passed a very comfortable night; nursed several times for a few minutes during the day and took three ounces of barley water. The kidneys and bowels had acted normally. He recognized those about him, and his pulse, respiration and temperature were normal.

Being pressed for a diagnosis, we frankly admitted our perplexity, but expressed the opinion that his condition had been due to some catarrhal process, or more likely to grip. The consultations were discontinued as he was considered to be convalescent.

5 P.M.—During the day there had been a rise of temperature and it is now 105°. There is an emphysematous patch, about an inch in diameter, directly over the vertex, which is supposed to be caused by the cold cloths now in use. However, the constitutional symptoms were of such importance that my suspicions were aroused and I directed the nurse to watch it and report to me if necessary.

Dec. 1st, 10 A.M.—Had a very restless night and his rectal temperature fluctuated from 102° to 106°. The entire scalp is covered with erysipelas and is greatly swollen, tense and painful. He again screams when moved. A 10 per cent ichthyol ointment ordered to be applied to scalp and blue powder to be discontinued.

5 P.M.—Erysipelas involves forehead and upper eyelids. A patch, one-eighth inch in diameter, at left angle of nose. Temperature 104°, but he is bright and takes more nourishment.

Dec. 2nd, 10 A.M.—Patient restless during the night, but the temperature did not go above 104°. Eyelids swollen and closed. Scalp less tense. Patch on left side of face involving two thirds of it. Beginning on right side of face. Brandy ordered.

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5 P.M.—Erysipelas covering scalp, both sides of face and a few inches of neck. Head has the appearance of a fireball and the features are distorted beyond recognition. Temperature 104°.

From this time there was nothing unusual in the case. It ran a typical course and was characterized by a profuse desquamation over the entire scalp and face. The convalescence was slow, but without complications, and he was well in less than two weeks from this date.

The initial symptom on Sunday which was mistaken for a convulsion must have been a chill, and it was not until Thursday that the erysipelas made its appearance on the vertex and not where we would have supposed, at the excoriation about the nose. There was no history of any infection or contagion. I had not myself seen any erysipelas, and the family had been in the city some little time. The age and the fact that the child recovered are interesting. We know, of course, that erysipelas in infants under six months is almost always fatal. The only other successful case I have found in medical literature younger than this is one reported by Dr. J. Lewis Smith. For these reasons, but particularly because of the difficulty of diagnosis, I thought the case worthy of being reported.

DISCUSSION.

DR. HOLT thought it not very uncommon for the constitutional symptoms of erysipelas to exist for twenty-four hours before the local symptoms were evident, but he had never met with a case where the constitutional symptoms preceded the local ones for so long a time as that just reported. The case was undoubtedly from the beginning one of infection, developing eventually into true erysipelas. It was, of course, possible that there might have been influenza at the beginning, but this was hardly probable. He was inclined to regard the case as only one of erysipelas with an unusually long early stage.

DR. SEIBERT could not understand how the eruption could be so long deferred, for in experimental erysipelas the initial stage is only twenty-four hours. Where must the cocci have been all this time?

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DR. HATFIELD said he had never failed to find the source of infection by sufficiently careful examination, and he would like to know where it was in this case.

DR. ADAMS said that he could not say positively. The agent from whom the family rented the house gave a certificate as to the good sanitary condition of the house, the family had been there two weeks, and the servants came from New York.

DR. SEIBERT said he wished to call attention to the fact that the treatment of erysipelas by a bloody fence made in the tissues surronnding the erysipelas had never failed him. He used it in the treatment of erysipelas of the extremities and trunk. He had published a number of these eases. His plan was not to give an anæsthetic, but to use as a scarificator a fresh paper of needles, carrying these around the extremity or over the trunk; it could all be done in a few seconds. After this moist dressings were applied. Some surgeons had reported failure, but they used a small scalpel, and the pressure of the bandage closed the wound made by the scalpel. Scarifying is much better, because the epithelium is sufficiently removed to allow of the wound remaining open for some time.

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## SARCOMA OF THE SKIN OF THE BACK IN A BABY.

BY WALTER LESTER CARR, M.D.,

New York City.

F. McK.—Female, aet. 7 months, second child of healthy parents, was brought to the Out-patient Department of St. Mary's Free Hospital for Children on January 27th, 1893, to be treated for a growth on the back.

The family history was negative; both parents were healthy Irish, and denied that tuberculosis, scrofula, syphilis or cancer had ever existed in them or their relatives.

The mother stated that the growth was first noticed when the baby was three months old, and at that time, four months before she came to the hospital, it was much

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smaller and somewhat reddened. The baby had not been ill nor had anything injured her. On further questioning, however, the mother said that before she was cognizant of the tumor the baby was troubled greatly with the "prickly heat."

The baby was a well nourished infant, rather fat, with the skin in good condition. The tumor was found to be located on the right side of the back between the inferior angle of the scapula and the lower ribs.

The growth had a yellowish, flattened surface, a centre slightly depressed, and around the edge a marginal zone of small blood-vessels. It was raised about three-eighths of an inch above the skin and extended seven-eighths of an inch in one direction and an inch and five-eighths in the other; the shape being an irregular ovoid.

It was moveable from the underlying structures and evidently was not deeper than the cellular tissues. There were no other growths or enlarged glands in any part of the body.

After ten days I observed two small nodules just below the tumor and decided to operate at once, although there was no apparent change in the original growth.

With the assistance of Dr. E. C. Mowry I removed all of the diseased tissue, which was found not adherent, except in one place where it was attached in a loose way to the muscle as if extension of the growth were just beginning.

The edges of the wound were brought together with cat-gut, the parts were dusted with iodoform and dressed with iodoform gauze. The union was complete in four days. There were two or three drops of pus around a cat-gut ligature applied a to small vessel, but it did not interfere with the healing of the wound.

May 20th.—I examined the site of the tumor and found the cicatrix and surrounding tissues soft and healthy. No new growths were to be seen and the glands were normal.

I am indebted to Dr. R. G. Freeman, pathologist to St. Mary's Hospital, for the following report, which I quote *verbatim:*

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"The tumor is a spheroidal celled sarcoma of the skin. It consists of a connective tissue basement substance and of cells, mostly spheroidal, and a few spindle-shaped cells. The tumor is fairly circumscribed and, for the most part, its deeper portion is surrounded by a layer of connective tissue; in places, however, this is wanting and the cells are extending into the subcutaneous fat."

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## ABSCESS OF LUNG IN CHILD THIRTEEN AND ONE-HALF MONTHS OLD; OPERATION; RECOVERY (WITH TEMPERATIVE CHART).

BY F. HUBER, M.D.

New York.

IN the transactions of this society for 1891 (Archives of Pediatrics, Vol. IX., p. 321), I reported a case of abscess of lung in a boy four years old. Since then another case has come under my observation. The tender age, the early diagnosis of a pulmonary abscess with pleural adhesions between the panetal and pulmonary pleura, and the rapid recovery after operation, must serve as an apology for reporting the case at length.

Walter L. H., thirteen and one-half months old, a flabby, fat, rachitis child, was taken acutely ill on April 26, 1892. The initial symptoms were vomiting, high temperature, followed the next day by cough and moaning respiration. An acute lobar pneumonia was suspected, and within twenty-four hours the physical signs showed that the process was localized at the right apex posteriorly. The diagnosis was confirmed by Professor Jacobi, who kindly saw the case in consultation during the first week. Through the courtesy of the father, Dr. John Horn, I had frequent opportunities to see the patient, and at no time during the progress of the disease could we detect any abnormal physical signs at any other portion of the lung except in upper lobe on the right side.

The subsequent course, in brief, was characterized by a

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continued temperature remitting in type (to be referred to later), marked prostration and diarrhœa. At first the cough did not present any unusual feature; later on it assumed a paroxysmal character and became very distress-

become adherent, an exploratory puncture in the third intercostal space anteriorly was made, and at a distance

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of about one inch pus was detected, and the suspicion of abscess of the lung was confirmed. A localized empyema was excluded because of the absence of former pleuritic inflammations.

The temperature was carefully recorded (chart of temperature and pulse accompanies this history). The fever did not seem to be materially influenced by the medical treatment. Starting with an initial temperature of 105°, April 26th, it reached 106° at 5.30 the following morning. For four days it ran an average of 104.5, with daily remissions of 1 to 1½°. On the sixth day it fell to 101.4, to rise again the same day to 103. On the eighth day it fell to 98.5; from this time on for the next ten days the fever fluctuated, often reaching 102+ a number of times as low as 100 5. A new exacerbation occurred with daily fluctuations between 103+ and 101, to fall again below 100° three days later. At 6 P. M. of the twenty-first day it reached 104+; from this time on it gradually receded, and on the twenty-fourth day it was but a little above 100.° For the next three days it was nearly normal, and at the time of the operation (twenty-seventh day) P., 120; R., 40; T., 100.

*Operation.*—The usual aseptic and antiseptic precautions being observed, the patient was narcotized by Dr. Joseph Huber (chloroform being used), and with the assistance of Dr. Horn the operation was proceeded with. Exploratory puncture resorted to; pus detected; needle left in as a guide. An incision two and one-half inches long was made in the third intercostal space anteriorly. The skin, superficial and deeper faceia with muscles cut through until pleura was reached. As we were certain, from a careful consideration of the physical signs during the past few days, that adhesions had shut off the pleural sac, a grooved director was gently insinuated along the side of the needle and the abscess cavity readily reached. A pair of dressing forceps were now introduced and opened up, frothy blood escaping with the pus. A Trousseau's tracheal director was then used, and the blades separated about three-fourth inches. Between the sepa-

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rated blades a drainage tube about three-eighths inches in calibre and two and a-half inches long was readily introduced. A probe introduced into its lumen demonstrated that the tube was free and not bent upon itself, and could be passed a distance of three inches directly backwards before any obstruction was reached. In cleaning the parts around the wound it was noticed that whenever a drop of fluid entered the drain a paroxysmal cough would result, thus clearly establishing the intra pulmonary character of the abscess and its communication with a bronchial tube. The paroxysms induced thereby were similar to those observed before the operation. From the amount of pus escaping, we estimated that the cavity held about one and one-half ounces.

No irrigation of cavity; dry dressings employed.

At time of operation T., 100; P., 120; R., 40. Following morning at 2 A. M., T., 103.4; P., 140; R., 68. Then gradually fell, to rise to 102.8 about 9 P. M.; from this time steadily declined, so that two days later it fell to 100°, and then 99°, with no further elevation.

No general empyema followed, and the subsequent favorable course was not interrupted by any unpleasant symptoms; the dressings were changed every few days, the tube gradually shortened and dispensed with in less than three weeks. For a short time longer a piece of catgut was used as a drain. When this was left out the stems soon closed. The little one was then sent to the mountains, where he quickly recovered his strength. Examined subsequently, no impairment of respiratory function in right upper lobe.

The points of interest to those of us who had an opportunity to study the case at intervals were: 1st. The paroxysmal character of the cough attended by little or no secretion. 2nd. The occurrence of an adhesive pleurisy, which greatly simplified the subsequent operation. 3rd. The value of allowing the needle to remain in situ as a guide for the deeper incision. 4th. The rapid recovery without any impairment in the functions of the upper lobe, after incision and drainage, with dry dressings.

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DISCUSSION.

Dr. Holt said that the author was to be congratulated on the prompt recovery of the case, and while the diagnosis in this case seemed to be clear, it is ordinarily very difficult. He would not feel absolutely sure, but after all it might have been a localized empyema, for it is often astonishing how deeply we must pass into the chest to reach the pus in a sacculated empyema, and what an enormous amount of fibrin is thrown out.

Dr. Huber said that localized empyema in children was rather rare, except when secondary to pleuritic processes. Since the drainage tube in his was introduced, a grooved director was employed to make sure that the tube was straight and unobstructed, and it was passed two and one-half inches directly backwards before any obstruction was met with. Again, the occurrence of the cough, as soon as a drop of fluid entered the tube, seemed to rather confirm his diagnosis.

Dr. Winters asked if it were not a fact that localized empyemata are very common after pleuro-pneumonia.

Dr. Huber said he had seen a very large number of empyemata in children, and except where there had been a primary pleuris some time before, he had not seen localized empyema.

Dr. Holt had seen at least three cases at autopsy of localized empyema within the past year.

Dr. Rotch thought there must be usually some antecedent condition.

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## MENINGITIS COMPLICATING PNEUMONIA IN YOUNG CHILDREN.

BY L. EMMETT HOLT, M.D.

Professor of Diseases of Children in the New York Polyclinic.

THE occurrence of cerebral symptoms in pneumonia, particularly in the early days of the disease, is so frequent that it need not now be dwelt upon. It is a familiar fact to all who see very much of acute pneumonia in children. It is striking, however, that these early symptoms almost never depend upon cerebral inflammation. The explanation of these symptoms has been from time to time a subject

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of much discussion. There seems now to be little doubt that they are due to the sudden impression made upon the nervous system by the absorption of toxic products from the lungs.

A new interest has been given to these symptoms within the last few years by the discovery that the diplococcus of Fraenkel and Weichselbaum, or as it is frequently known, the pneumococcus, has been found in very many cases as the only micro-organism present in acute cerebral and cerebro-spinal meningitis. In other cases of cerebro-spinal meningitis, however, totally different results have been obtained by cultures, showing that the diplococcus is not by any means the only cause.

The dependence of certain cases of meningitis and pneumonia upon a common cause brings the two diseases into a clinical relation similiar to that existing between tubercular pneumonia and tubercular meningitis. Thus we may have extensive cerebral lesions with but few changes in the lungs, or we may find the cerebral complication developing in the course of the acute pulmonary symptoms, or following in their wake. It has long been a matter of common observation that pulmonary complications were very common in cerebro-spinal meningitis. The occurrence of meningitis in the course of acute pneumonia is, however, surprisingly infrequent when we consider how great is the tendency of tubercular infection in childhood to affect the brain. Since meningitis occurs as a complication of pneumonia at all it is only a surprise that it is not more common.

My personal statistics of a little over five hundred cases of acute pneumonia observed in private and hospital practice have furnished four cases complicated with meningitis. This would place the frequency at a little less than one per cent., which is perhaps not far out of the way.

The type of pneumonia with which the meningitis has been most frequently seen has been acute pleuro-pneumonia.

In this clinical report I shall narrate briefly the histories of four cases of meningitis complicating pneumonia,

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and by way of comparison give two or three other reports illustrating some of the difficulties of diagnosis.

The first case is one of cerebro-spinal meningitis due to the pneumoccus and is of special interest in this connection as the symptoms, excepting for the last eighteen hours of the three days' illness, were chiefly pulmonary; and the case was regarded in the beginning as one of pneumonia. Although no consolidation of the lungs was found at autopsy they were the seat of very intense congestion, and the presence in them of the diplococcus in great numbers showed that they had been involved in the pathological processes. This case is not included among the four.

CASE I.—*Cerebro-Spinal Meningitis due to Diplococcus Pneumoniæ.*

The following history is abstracted from the New York Pathological Society's reports of 1890, where it was published.

A female infant, thirteen months old, previously in excellent health; while standing in her crib fell a short distance to the floor striking upon the chest and forehead. She cried considerably at the time, but in two hours was apparently as well as usual. During the following night she vomited but slept quietly, and the next morning nothing abnormal was noticed excepting a small ecchymosis below left eye. Toward evening she became fretful and the temperature rose to 103° F. She vomited several times during the night, and once slight convulsive twitchings of the face were noticed. The illness lasted three days from this time. Vomiting was persistent; there was no constipation; the temperature was steadily high, between 102.5° and 105.5°. There was marked and steadily increasing prostration, there was slight cyanosis, and this with the rapid breathing and persistent higher temperature led to the suspicion of pneumonia, although physical signs in the chest were inconclusive.

Eighteen hours before death, marked nervous symptoms developed; drowsiness gradually merging into a stupor and finally complete coma. There was rigidity of the lower extremities and twitching in the muscles of the right face and arm, but no opisthotonus, no retraction of the abdomen, no changes in the pupils, no constipation.

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Autopsy showed a diffuse meningitis principally of the convexity of the brain and a purulent exudation in the meninges of the cord, chiefly in the cervical portion. The lungs were intensely congested but there were no areas of consolidation.

Cultures were made by Dr. T. M. Prudden from the exudate of the brain and from the lungs, and pure cultures of the diplococcus pneumoniæ were found from both. Inoculations into animals were made and the organism proven to be pathogenic.

The next case is one of acute pneumonia with a subsidence of the general symptoms but only partially resolution. After about a weeks' interval a new attack of pneumonia occurred, probably a fresh infection from the old unresolved area. Death took place on the fifteenth day of the second attack from meningitis; but this complication was marked by absolutely no new symptoms there was nothing whatever to call attention to the brain and the presence of the meningitis was entirely unsuspected.

CASE II.—*Pleuro-pneumonia; Delayed resolution; Death from Acute Meningitis six weeks after the beginning of illness.*—Harry H., six months old, was admitted to the New York Infant Asylum June 5, 1890, with a history of having had an attack of pneumonia two weeks before, from which he was supposed to have recovered.

On examination there was found to be an area of consolidation in the left lower lobe posteriorly, the signs being bronchial breathing, and voice and slight dulness. The child was in fair condition, weighing a little over twelve pounds, and the lungs excepting for the signs above noted were normal. The child gained in weight and was apparently improving in all respects until five days later when the temperature rose to 102° F., and all signs of acute pulmonary disease developed. The temperature continued steadily high for four days with the usual symptoms of pneumonia. The physical signs showed an extension of the disease in the left lung about the old area of consolidation and later there developed a consolidation at the right base.

On the fifth day of this attack the temperature fell to normal and remained there for four days without, however, any improvement in the physical signs.

On the 18th of June the temperature again rose nearly to 104° F., and during the next two weeks it ranged us-

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ually between 101° F. and 104 F., touching the normal point but once. During this period there was a gradual extension of the signs on the right side of the chest and during the last week the dulness became very pronounced; bronchial breathing was present over the greater part of the right lung behind, mixed with coarse friction sounds. The general symptoms were those of a case of severe pneumonia dying slowly from exhaustion.

Once, on June 25th, a little twitching was noticed about the eyes, but at no other times was there noticed any tendency to convulsive moments. There were frequent attacks of cyanosis and a gradual failure of strength, with a moderate amount of restlessness and steadily increasing prostration. Just before death a few fine petechial spots were noticed on the abdomen. There was nothing in the history to suggest cerebral complications, no opisthotonus, no coma, no evidence of pain in the head, no vomiting, and the bowels continued normal. The child was a little dull for the last few days but not enough to excite suspicion.

The autopsy showed diffuse menigitis at the convexity with an abundant purulent exudate, most marked over the anterior portion of the brain. At the base it was most marked along the Sylvian fissures and over the cerebellum. The ventricles were not distended. The right lung was coated with a thick yellow layer of lymph, in places one-fourth of an inch in thickness, in the meshes of which were small collections of pus. The lower lobe and the posterior portion of the upper lobe were consolidated. The left lung was coated with a thick layer of recent fibrine and the lower lobe was consolidated.

The other organs were essentially normal.

The interesting features about this case are the prolonged course of the pneumonia and the very intense meningitis, the exudate of which was the most abundant I have ever seen, and that too without cerebral symptoms.

In the next case the pneumonia ran a straight regular course but was marked by excessively high temperature. Meningitis was ushered in three days before death, with well marked symptoms and the diagnosis was very plain.

CASE III.—*Double Pneumonia. Intercurrent Meningitis on the Thirteenth Day.*—Frances M., female, one year old, previously in excellent health was taken suddenly ill. Dec. 12, 1889, with rapid breathing, temperature 102.4° and general restlessness.

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On the the third day the temperature rose to 106 ° F. There was frequent vomiting and great prostration but no positive signs of disease found in the chest until the fifth day, when a small area ofconsolidation was discovered at the base of the left lung. It had been evident from the beginning that the case was one of pneumonia from the general symptoms. The case ran a very intense course and on the seventh day the temperature touched 107° F.

There were no nervous symptoms excepting extreme restlessness associated with the hyperpyrexia. The case went on with very little change until the thirteenth day when the child had general convulsions which were continued during most of the night. The temperature, however, fell to a lower point than for several days.

On the morning of the fourteenth day there was found rigidity of the upper extremities and of the neck. The eyes turned upward and to the left, staring vacantly. On the following night the temperature again rose to 107° F.

On the fifteenth day the nervous symptoms were very marked—irregular respiration, irregular pulse,very marked rigidity, of the neck and of the trunk, rigidity of the upper extremities, convulsive movements of the left arm and leg noticed. Left pupil responded to light, but the right only very feebly.

The child passed gradually into a condition of coma and died early on the morning of the sixteenth day of the disease, and on the fourth day of the nervous symptoms.

The autopsy showed consolidation of the posterior portions of the right upper lobe and of nearly the whole of the right lower lobe ; consolidation of nearly the whole of the left lower lobe. In addition there was found a diffuse meningitis at the convexity, the brain being completely enveloped in the purulent exudation.

The following case of meningitis developing at the close of a pneumonia of irregular type illustrates the great difficulty of diagnosis between this condition and pulmonary tuberculosis terminating in tubercular meningitis. The circumstances surrounding the case were so like tuberculosis that I had no hesitation in making that diagnosis.

In certain of these cases the differential diagnosis seems to me to be impossible.

CASE IV.—*Pleuro-Pneumonia. Almost Complete Resloution. Late Meningitis. The course of the Disease*

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*closely resembling Tuberculosis.*—Celia G., a delicate child twenty months old, was taken ill Nov. 14, 1892, with high temperature, cough and moderate prostration. The pulmonary signs were very few in the beginning and the temperature fluctuated irregularly for ten days, at the end of which time consolidation was for the first time made out at the left apex anteriorly ; the signs being dulness, bronchial breathing and bronchial voice. Previously only scattered rales had been noticed in the chest. The irregular temperature, the gradual development of the symptoms, the location of the physical signs and the child's previously delicate condition led to the suspicion of tuberculosis. The fact that the spleen was enlarged enough to be felt below the ribs strengthened this impression. During the next two days the consolidation extended to nearly the whole of the left upper lobe, signs being present both front and back.

By the seventeenth day there were signs of consolidation over the left base behind, although those in front were less distinct.

At the end of the third week the temperature fell nearly to normal and remained below 100° F. for three days. Signs of resolution were present over the lung. The evidences of consolidation had entirely disappeared from the upper lobe, but there was still at the left base a small area giving marked dulness.

On the twenty-fourth day the temperature again rose to 104 ° F. The child passed a restless night and vomited. The next day she vomited frequently and had a general convulsion in the morning which was repeated during the day. The abdomen was retracted, there was ptosis of the right eye, face drawn to right side and frequent convulsive movements of the right arm and hand were seen. From this time the cerebral symptoms were very marked. Convulsions occurred frequently unless controlled by drugs and on the twenty-seventh day the child passed into a condition of semi-coma.

On the twenty-ninth day there was rigidity of neck, opisthotonus, stupor and death in general convulsions. The cerebral symptoms had lasted six days.

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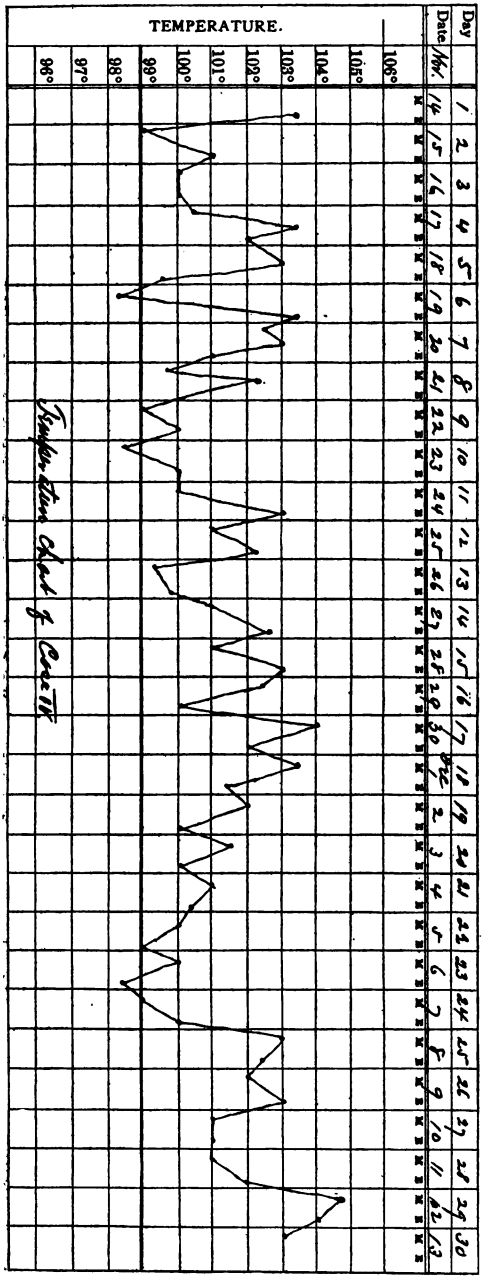


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It was somewhat of a surprise in this case to note the disappearance of the signs of consolidation at the left apex in front during the illness; but the development of meningitis during the fourth week seemed to justify the first diagnosis of pulmonary tuberculosis, which process had now extended to the brain.

The autopsy, however, showed no evidence of tuberculosis in any part of the body. There was diffuse meningitis most marked over the convexity and anteriorly with a pretty abundant exudate at the base. Resolution had been complete in the left upper lobe and was almost complete in the lower lobe. Encapsulated in the pleura at the left base was a yellowish-green mass of fibrine one-fourth of an inch thick and about two inches wide by three inches long. This appeared to be the focus from which the meningeal infection took place.

This in its clinical history is almost as typical a case of pulmonary tuberculosis with tubercular meningitis as could be given.

In marked contrast with the foregoing case is the next one in which, although there was nothing to suggest tuberculosis, yet the meningitis was of tubercular origin.

CASE V.—*Acute Lobar Pneumonia followed by Tubercular Meningitis.*—Frances L., 2 years old; an inmate of the Nursery and Child's Hospital for three months.

The child had been previously healthy ; family history negative.

On Feb. 22, 1893, she was taken with a temperature of 103° F. and acute pulmonary symptoms. On the fourth day signs of consolidation were present over the left base. The symptoms up to this time had been those of fairly typical pneumonia. The temperature fell on the seventh day below 101° F., but a slight rise occurred on the eighth day. On the eleventh day the temperature was below 100° F., and during the next three days continued near the normal point. At the end of this period the signs of consolidation had disappeared, and only a few rales and rather feeble breathing were heard over the area previously involved.

On the fourteenth day the morning temperature was found 101° F. and in the evening it touched 102.6° F. The child had a dull, stupid look, but nothing else indicated cerebral complications. The next morning the night nurse reported that there had been some rigidity during the night and the neck seemed to be a

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little stiff. One of the ears now began to discharge, and it was thought possible that the nervous symptoms might have depended upon this cause. On the next day, however, the cerebral symptoms were so marked as to put all doubt aside regarding the diagnosis. The eyes were fixed, the stare vacant, the respiration very irregular and approaching the Cheyne-Stokes type. There was general relaxation, absence of all reflexes and almost complete coma. Death occurred in coma the following day with low temperature.

The autopsy showed well marked tubercular meningitis; tuberculosis of the bronchial lympath nodes; recent miliary tubercles in both lungs, the liver and the spleen; pneumonia in the stage of almost complete resolution in the left lower lobe. This upon microscopical examination was shown to be lobar pneumonia and not a tubercular process.

The case seems to have been unquestionably one of acute lobar pneumonia in a child who had latent tuberculosis. The acute pulmonary disease apparently lighted up the latent tubercular process, with the result of producing a general infection with tubercle bacilli, which in the brain were sufficiently numerous to excite meningitis.

This case is so like those of meningitis complicating pneumonia that a differential diagnosis seems impossible.

In the next case all the symptoms for the first three weeks were obscure and no diagnosis was made; although the autopsy showed meningitis and pneumonia it seems to me probable that there was an undetermined factor in the case, probably grippe.

CASE VI.—*Grippe (?) Pneumonia, Meningitis.*—Hilda M., 9 months old; an inmate of the Infant Asylum; father died of tuberculosis.

Child had previously had two attacks of measles. At the time of the present illness was in fair condition.

On Jan. 1, 1893, she was taken with a temperature of 103° F. and with symptoms of an indefinite character; there was restlessness, irritability, occasionally vomiting

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and although the rapid breathing and slight cough and continuous high temperature led to the suspicion of pneumonia the lungs were examined daily for a week with negative results.

During the second week of the illness the symptoms changed but slightly, and excepting the temperature the child would not have been considered seriously ill. The temperature ranged between 102° and 104° F.

During the third week pneumonia was still suspected, and frequent examinations of the lungs were made, but nothing excepting a few coarse rales found. On the twenty-third day the child was seized with general convulsions, opisthotonus, pulse 108 and irregular. The following day she was in a semi-comatose condition, unable to nurse. From this time the child lost rapidly in weight; had occasional attacks of general convulsions. On the twenty-sixth day were found dulness aud high-pitched breathing and a few fine rales at the base of the right lung; the spleen was enlarged. On the twenty-eighth day coma had become complete. No food could be taken by mouth. Child died during the night quietly.

The autopsy showed left lung normal. There was a small area of consolidation, size of English walnut in upper part of the right lung of a uniform reddish-gray color; on section; there was a slight recent pleurisy over the consolidated area, but elsewhere the pleura was normal. There was about one and a half ounces of sero-purulent fluid which escaped on opening the skull, and the brain was a seat of a diffuse meningitis, most marked over the anterior lobes and the base. The ventricles were moderately distended and the brain substance softened.

The other organs were essentially normal.

It seemed almost incredible in this case that the small spot of pneumonia found at autopsy could have been the cause of the temperature which had lasted for four weeks. On reviewing the case I am inclined to regard it as one of —first of grippe, secondly pneumonia, and thirdly men-

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ingitis. All very possibly depended upon the same poison.

In concluding this clinical report I would like to mention briefly another case of severe cerebral symptoms in the course of pneumonia from quite a different cause than any yet referred to.

A healthy child, eleven months old, on the twelfth day of a severe broncho-pneumonia was taken with general convulsions which were repeated at short intervals during the following three days, at the end of which time death took place. The convulsions were more marked upon the left side than upon the right. The right pupil was dilated; the left contracted. There was stupor which gradually passed into coma, and very marked rigidity of all four extremities, with exaggerated reflexes. Death took place in convulsions.

The autopsy showed the cause of the cerebral symptoms to be a diffuse meningeal hemorrhage which covered nearly the entire right hemisphere with quite a large area over the left hemisphere at the convexity.

The hemorrhage in this case seems to me to have been a cause of the convulsions rather than the result of them. The diagnosis from meningitis under such circumstances is almost impossible.

n conclusion, meningitis in pneumonia is rare. It is seen most frequently in pleuro–pneumonia and usually comes on late in the disease.

It may be so latent as to lead to no suspicion of cerebral complication. Latent cases are more common with the principal lesion at the convexity since lesions at the base are more likely to excite positive symptoms. The most frequent method of onset is by convulsions. The duration of the cases after the beginning of meningitis is usually less than four days.

It is to be borne in mind that this complication is possible so long as complete resolution has not occurred.

The diagnosis is to be made from pulmonary tuberculosis with meningitis and from meingeal hemorrhage. The prognosis is bad, death being almost certain.

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DISCUSSION.

DR. J. LEWIS SMITH said that it was to be recollected that in New York City there is at present quite an extensive epidemic of cerebro-spinal meningitis, and he thought he recognized in the narration of some of the cases symptoms of this disease. He had seen recently sometimes as many as two or three cases in one day. He would like to know whether these cases had not been selected at an unfortunate time.

DR. HOLT replied that one of them was observed in 1890, another in 1892, and only one during the present year.

DR. SMITH said he had been in practice constantly in New York City since 1871, when cerebro-spinal meningitis was first introduced among the horses and he considered the disease endemic in New York.

DR. ROTCH thought the cases presented were very important in aiding us in making a differential diagnosis.

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